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WATER SUPPLY & SANITARY IMPROVEMENT

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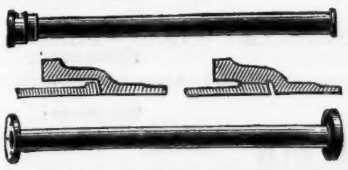

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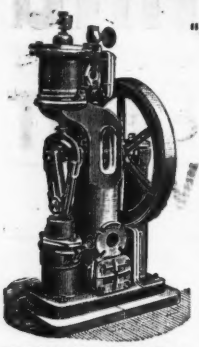

Fig. 703. "SINGLE RAM" STEAM-PUMP.

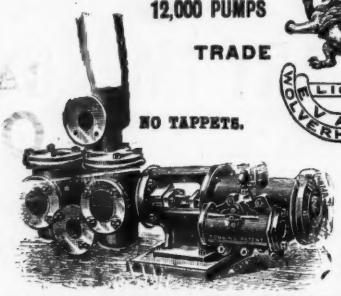

Fig. 506. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

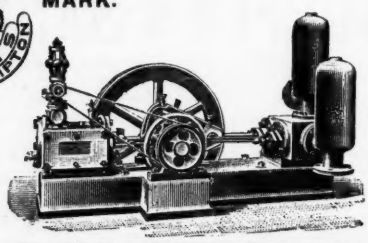

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

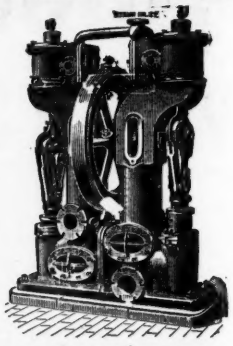

Fig. 712 "DOUBLE-RAM" STEAM-PUMP.

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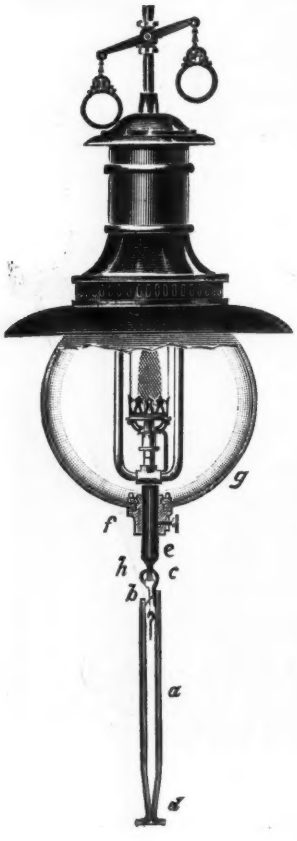

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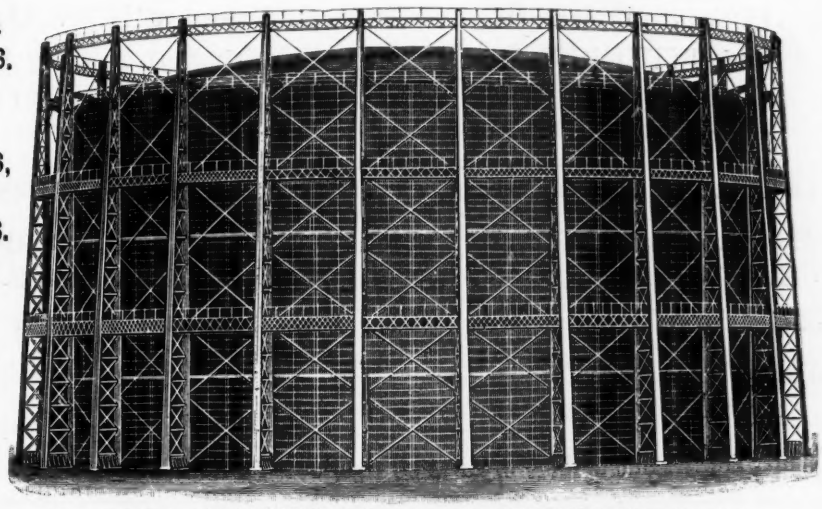

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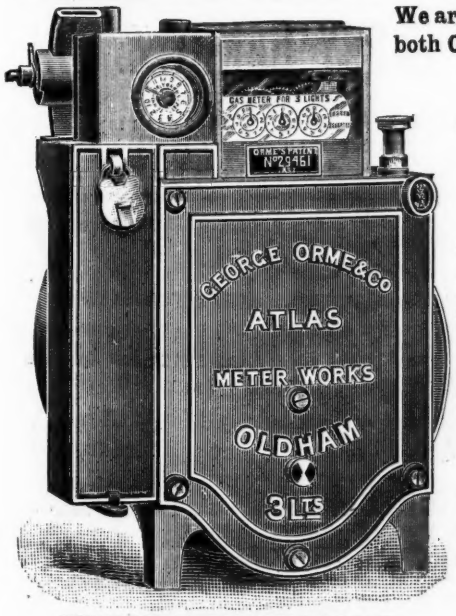

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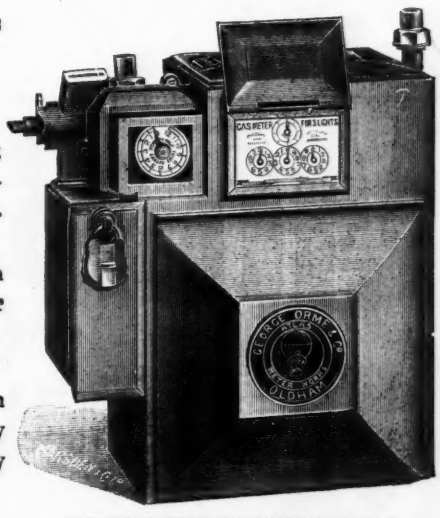

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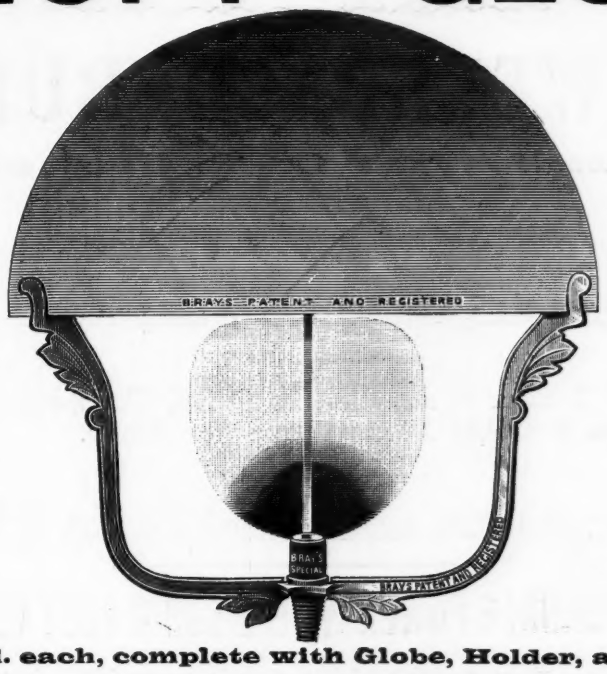

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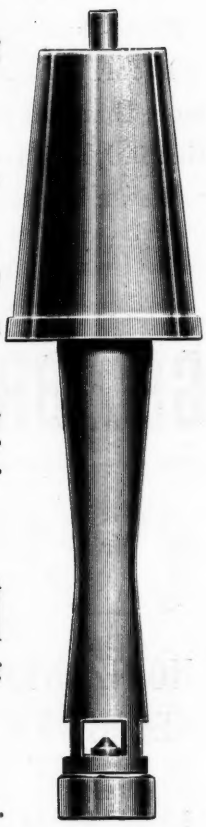

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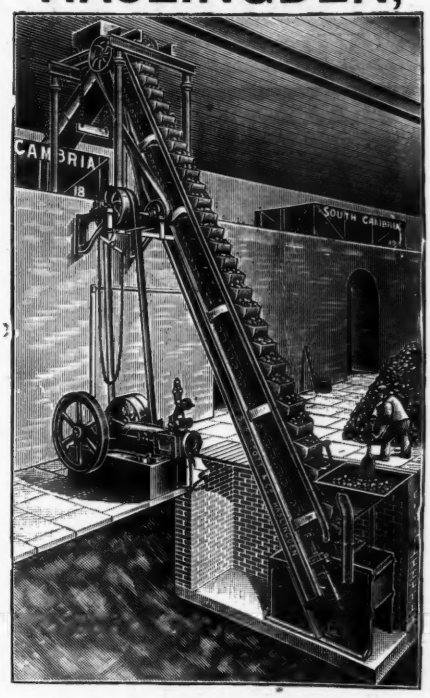

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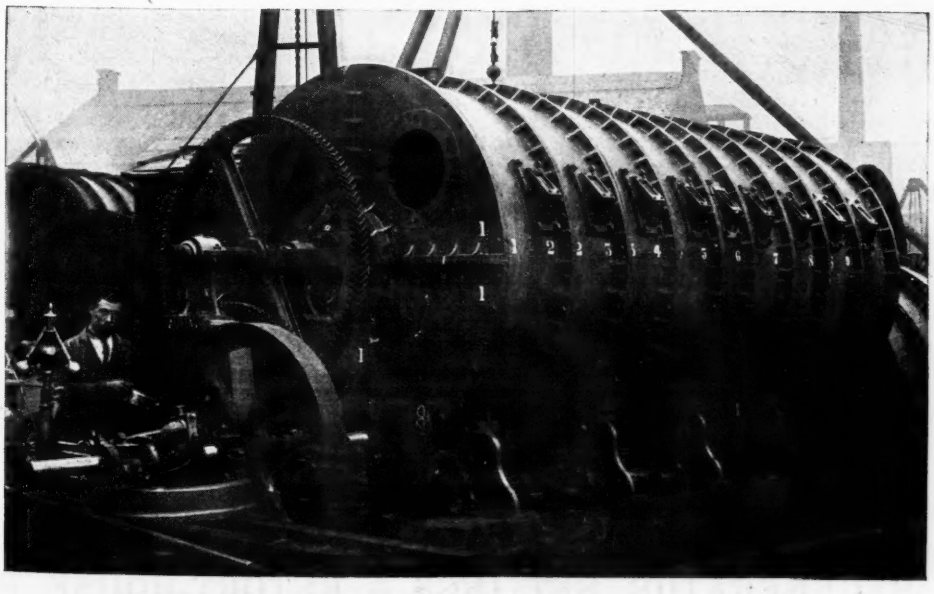

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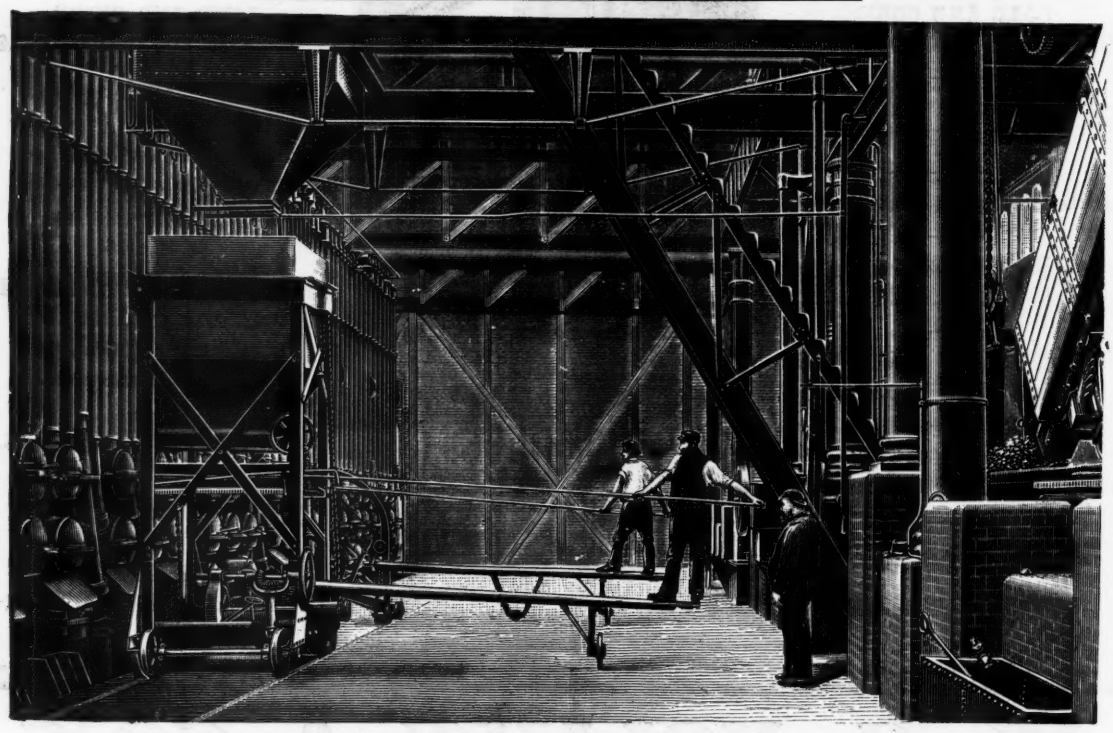

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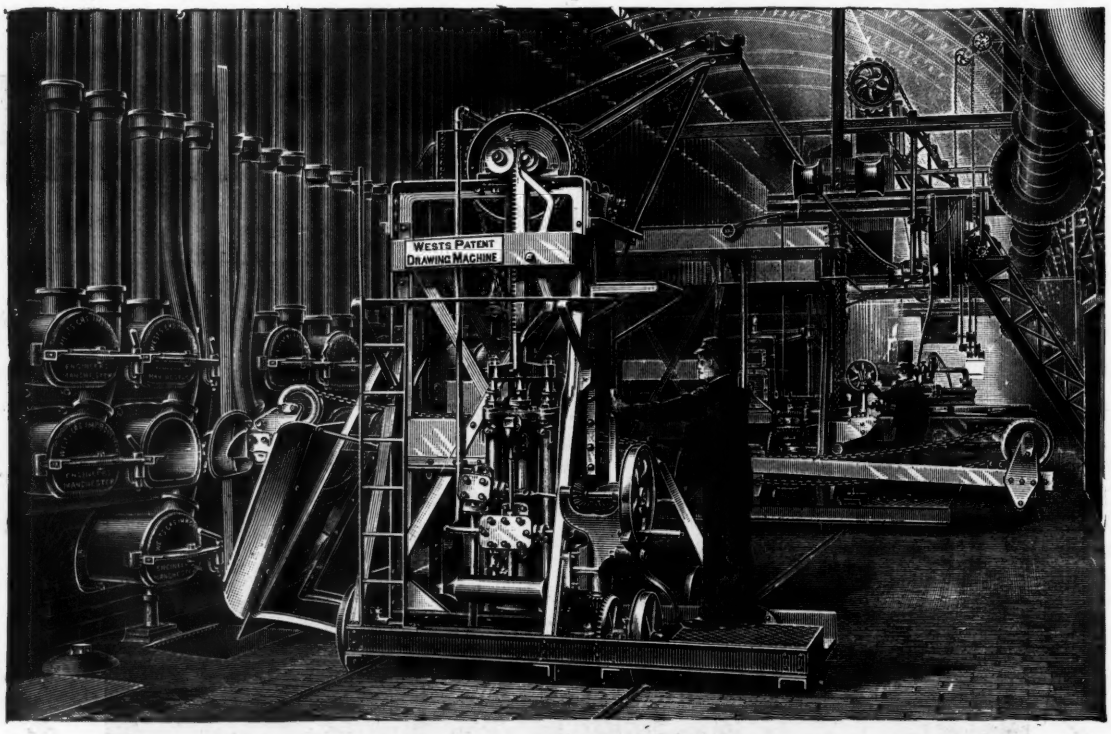

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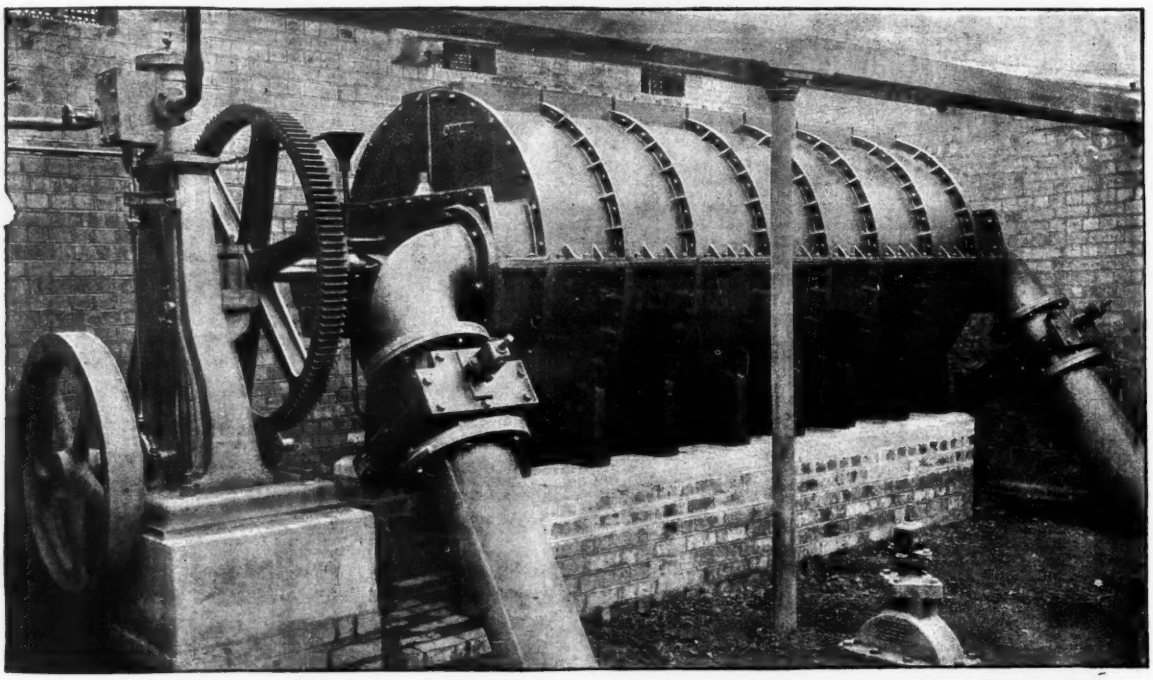

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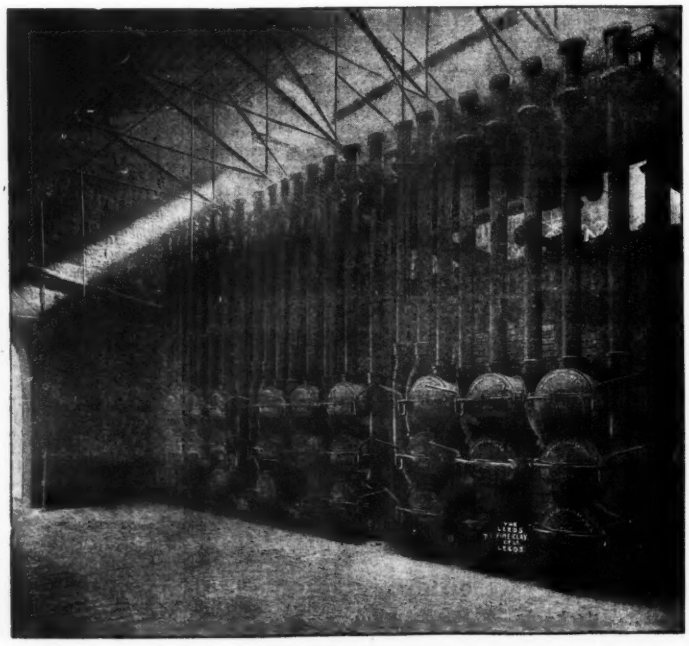

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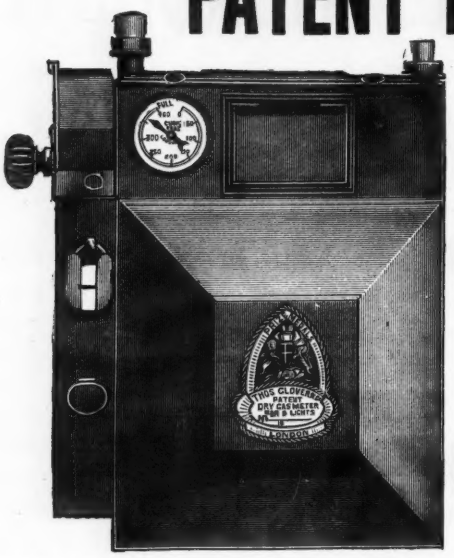

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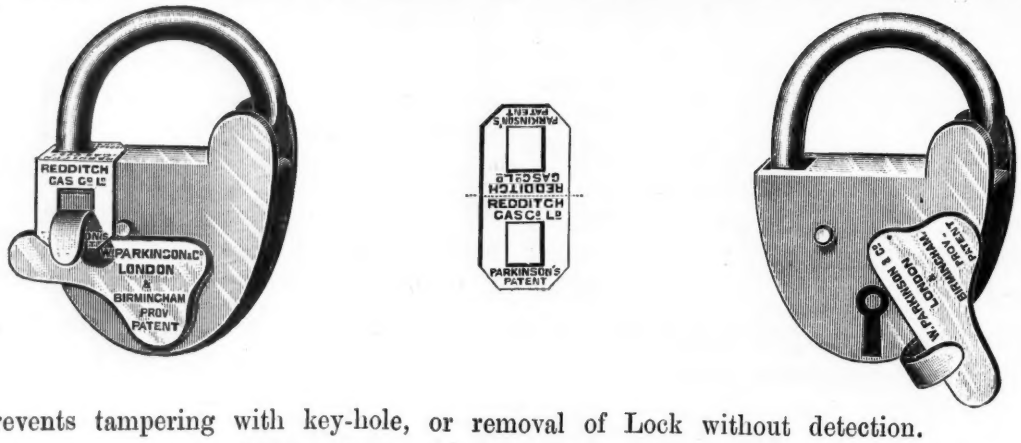
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EDITORIAL NOTES.

Rampant Municipalism.

THE spectacle of Municipalism rampant was exhibited this day week in Manchester, when, by invitation of the Lord Mayor, a conference of the Municipal Corporations of Lancashire and Cheshire was held to organize opposition to the Bills of the Lancashire Electric Power Company and the South Lancashire and Cheshire Electricity Company. Let it be understood what is the object of these Bills. They propose to acquire statutory powers for "pit-head" electricity generating stations, upon the assumption that the electricity can be generated in bulk very cheaply under the conditions, and afterwards distributed over a wide area, at a lower rate than it could be produced by small scattered installations. Supposing the assumption to be justified, the benefit of the arrangement for the areaof supply would be unquestionable. The oft-vaunted advantages of the Niagara power undertaking would be brought home to Lancashire and Cheshire. Isolated mills would be driven by cheap electric power; and the whole country-side would be covered with cheap electric tramways, practically annihilating distance for the working population. New industries would arise to take the place of old and dying trades; electric lighting would be cheapened everywhere; and the smoky town factory chimney would be superseded. It has often been pointed out by English mechanical engineers that steam power on the coalfields could be provided just as cheaply as, if not more so than, by any big water power in the world. All that was necessary was to find a use for it. This condition has been fulfilled by the promoters of the schemes now in question. We do not admit that the systems are good on the merits—that does not come into the present stage of the question. The principal point to be noted is that all the Municipalities of Lancashire and the parts adjacent are up in arms against these "Niagara" schemes. The better the schemes, the more virulent the opposition. These Municipalities will not have electricity supplied in bulk to their areas, whatever its benefits to the possible users, because the districts are their own preserves. They think they have the monopoly of this business, so far as their limits extend; and they are not going to let a pack of outsiders come in and sell for a penny what it suits them better to charge twopence or threepence for.

This is the case, in all its baldness; and it was in the sacred cause of Municipal Monopoly that Manchester welcomed Liverpool to its hospitable Lord Mayor's Parlour; and Salford, Oldham, Bolton, Preston, and a score more manufacturing towns, leaving their mutual antagonisms at home, foregathered on this historic occasion. "When they "do agree, their unanimity is wonderful!" The Lord Mayor of Manchester, in opening the proceedings, pitched the key of the subsequent harmony by declaring that the Bills contemplated acts of "trespass" upon Municipalities that had obtained electric lighting powers. Mr. Alderman Higginbottom followed, and laid claim to the monopoly of electricity supply under the Acts of 1882 and 1888, when the Order happens to belong to a Municipality. Liverpool "went one better," and accused the promoters of the Bills of intending to rob the ratepayers. The Town Clerk of Liverpool used a very funny argument in support of his contention. He said that only a very small percentage of the people anywhere enjoy Municipal electricity, and asked if it was reasonable that the Corporation should have to pledge the credit of the whole body of the ratepayers for the sake of the small minority of electricity users. He maintained that it was not, and that when Parliament authorized these undertakings it was, *or ought to have been*, on the distinct understanding that the Local Authorities were to have it all their own way. As a lawyer, Mr. Harcourt E. Clare very well knew what the terms of the Act are; and, as a man of affairs, he should have admitted that when people buy a property with a certain contingency attached to it, they must bear the consequences. It is quite open for a Municipality to regard the smallness of an electric lighting *clientèle* as a reason for refraining from pledging the credit of the whole body of ratepayers for their sake; but it is neither sound law nor common sense to argue that the circumstance of having so committed themselves warrants a Municipality in ignoring the words of an Act of Parliament. However, the word has gone forth; and all the parliamentary interest that these Lancashire

Municipalities can bring to bear will be directed to secure the rejection of the Bills. These plotters seem to forget, however, that their objection is one of principle, and that this very principle was formally approved by Parliament last year. Why do not the Municipalities show the courage of their convictions, and get somebody to introduce a Bill to amend the Electric Lighting Acts by enacting that, where an Order is in the possession of a Local Authority, it shall have the effect of an absolute monopoly? This is what they want, and what they pretend to believe they already possess—only, somehow, the Acts say the precise contrary, which is awkward.

We mention this matter here for the sake of its general bearing upon the wide question of the attitude of modern Municipalism towards private enterprise. Of course, this Manchester performance is quite in the spirit of Progressivism, and is highly applauded by the same party that holds the London County Council as justified in spending the ratepayers' money on a chimerical Welsh water supply scheme for competing with the statutory undertakings of the London Water Companies. Once more, therefore, it is made to appear that what is sauce for the private goose is anything but a suitable condiment for the municipal gander.

The Meeting of the Miners' Federation.

The Miners' Federation have been holding a somewhat sensational meeting during the past week; the leading incident of the proceedings being the admission into the Federation ranks of the "repentant Welshmen," who came in because they had made such a miserable mess of their strike. These Welshmen, headed by Mr. Abrahams, M.P., practically confessed that they had been quite incapable of managing a strike on their own account; so they wanted to join those who seemed better able to play the game. The Federation leaders were magnanimous enough to take the Welshmen in, letting all bygones be bygones. Now this has been done, it is to be hoped that the Federation managers will be happier. They have had emissaries in South Wales working to this end for years. They hated the sliding-scale, and wanted to upset it; but they would naturally have preferred to effect this object before the late "unpleasantness," which left the employers so much stronger and the men so much weaker. It is not very apparent at present what the Federation can do for the Welsh contingent. We do not suppose that anything will be done for a considerable time yet, as the newly-added area will need organizing upon Federation lines. This, again, will prove a ticklish job, unless the Welsh miner has so far changed his nature as to like his English brother, whom he has always cordially hated. It is a matter of sincere regret with the Federation leaders that the North of England men still keep aloof from them. Hopes of ultimate union were expressed at the meeting; but the views of the two bodies of men upon such a crucial matter as the eight-hour day are too divergent for them to accept a common administration.

An interesting part of the transactions of the Federation meeting related to the operation of the Workmen's Compensation Act in connection with coal mining. The experiences of different districts have varied considerably. Where the local Miners' Unions have antagonized the employers, and put everything to the rigid test of the law, there has been trouble and hardship. In such places, elderly and defective men have been got rid of remorselessly; and there has even been trouble in getting the money out of the Courts. On the other hand, the testimony is unanimous that where masters and men have agreed to make the best of things, the Act has worked satisfactorily. It is the old tale of the quality of a law being dependent upon its administration. The evidence of the Secretary to the Scottish Miners was very emphatic in favour of the Act, which they thought was the best law that had ever been passed. "They in the East of Scotland had had "over thirty cases; and they had never had to pay one "penny to a lawyer, and they had had no difficulty in "obtaining compensation. . . . . They had never had "any injured men refused employment; and they had "never had any men discharged because of the Act." After much discussion, a series of proposed amendments to the Act were drafted and passed, chiefly aiming at its extension to all workpeople. A very laudable desire; but, surely, rather a hasty demand, if it is true that there is so great a lack of uniformity in the application of the Act as it at present stands. A complaint was made by Mr. Abrahams of the action of the Registrar of Friendly Societies, who, he said, was too partial in passing employers' compensation schemes outside the Act. This is a striking commentary on what has often been remarked here about the ease with which employers could devise better schemes of compensation for their own special circumstances than anything offered by the strict letter of the Act. Evidently, according to Mr. Abrahams, the employers have done so in many instances; and the Registrar of Friendly Societies has certified these schemes as being an improvement on the Act. There is nothing to complain of in this—rather it is something to be thankful for that employers can see their way to improve upon the law. But the professional Trade Unionist can never perceive any good in an arrangement which keeps masters and men friendly and content.

Mr. Corbet Woodall's Report on the Southport Gas-Works.

An important stage in a long and somewhat painful tale of a municipalized gas supply is completed by the publication of an abstract of Mr. Corbet Woodall's report on the Southport Corporation gas undertaking. There has been some "unpleasantness" at Southport over the administration and management of the gas-works for a considerable time; and the local Gas Manager (Mr. John Booth) has been made the subject of some bitter semi-political attacks. The agitation reached its climax when the Manager's report on the working for the last financial year disclosed a decrease of gas consumption. It also happened that the Committee had entered upon a policy of selling gas at cost price for cooking purposes, and had abolished meter-rents. These things coming together, made the report look less rosy than usual; and some members of the Corporation forthwith jumped to the conclusion that matters at the gas-works must be in a bad way. The report was withdrawn when it should have been presented to the Town Council in the ordinary course; and at the adjourned presentation there was a lively scene, ending in the retirement of the Chairman of the Gas Committee. A resolution was carried for the appointment of a "first-class expert" to investigate and report upon the gas estate; and Mr. Corbet Woodall was accordingly chosen for the task in September last. The irony of the situation was that, by the time this prudent step was taken, the business of the gas undertaking had considerably improved; but this, of course, did not stop the inquiry. There is no shame to anyone concerned in this determination to have the Southport gas estate independently inspected and reported upon. Indeed, it would be a very good thing if the plan were to be followed more frequently and generally. In the case of Southport, Mr. Woodall has been able to speak well of the general arrangement and condition of the works, but condemns the carbonizing plant as antiquated. There is a fine carburetted water-gas apparatus on the works, which for some unknown reason is not much used. The Committee have been charging a great deal of reconstruction and extension work to revenue, which may be good policy, but of course runs away with the profits. It is, however, unnecessary to paraphrase Mr. Woodall's report, which contains a good deal to exercise the Gas Committee and the Corporation. The curse of profit-grabbing in aid of the rates lies at the bottom of the whole disturbance. The report will do good in other places besides Southport, if only by exposing the facility with which trading Municipalities can deceive themselves as to the amount of their profits. The report exonerates the works management from the worst of the charges levelled against the Committee and Mr. Booth during the Town Council debates, while justifying the feeling of those who instigated the inquiry that all was not quite as it should be with the undertaking.

The Philosophy of Street Labelling.

The philosophy of little things is very fascinating. Lord Grimthorpe has recently descended from those heights of ecclesiastical law, over which he has lately been chasing the amateur of church discipline, and has favoured the readers of "The Times" with his views on the lettering of streets. The change of quarry is welcome. We are not all interested in the hair-splitting definitions of canonical law; but we are nearly concerned in finding our way about the material world. And there is some ground for the complaint that the authorities of English towns are in this respect less considerate than they might be of the needs of strangers. Somebody pointed out the other day that a wayfarer might

pass through many a town in the course of a day's bicycling without once seeing the name of the place posted up anywhere. The complaint is just. Now Lord Grimthorpe writes to ask that the identity of streets in towns should be placed more conspicuously in evidence. What with the increasing height of the houses, and the other transformations that streets are continually undergoing, it is, as his Lordship says, becoming more and more difficult to find one's way about, especially in the dusk of evening, or fogs. "Memory of the look of old houses and corners and shops, "which used to be familiar, no longer helps, but hinders "you." There is something pathetic in the suggestion of the old Londoner revisiting the scenes of his early struggles, when the streets were not paved with gold, and failing to find his way about the historic landmarks. Lord Grimthorpe confesses to having had to ignominiously ask where he was, in some parts of London, owing to his having overshot crossings which everyone used to recognize unconsciously. He declares the only remedy is to have the street names painted on the lamps at every crossing, and on two sides of each lamp; "and, better still, set diagonally, as "they ought to be at railway stations also, which do give "us lamps. That is the only attitude in which the names "can be read '*eundo, redeundo, et morando.*'" With a touch of characteristic humour, Lord Grimthorpe suggests that if the County Council have not yet power to adopt or obtain it on proper terms from the Gas Companies, "nobody would be stupid enough to obstruct a Bill "for that purpose, or clever enough to invent a rational "objection to it." The circumstance of the writer not having noticed the tentatives made in different parts of London, and elsewhere, to realize the object he has in view, must be taken to indicate that his street wanderings have been circumscribed. It is a lamentable fact that over large areas of the west central and western parts of London the street lighting is scandalously bad in every particular. How the market gardeners' carts find their way in and out of Covent Garden, is a mystery; and all over this part of London it is almost as easy to lose oneself now as ever it was when Seven Dials was a name to shudder at. But if Lord Grimthorpe had looked into the matter a little further, with that eagle eye of his, he would have perceived that it is by no means easy to letter streets and street corners plainly by day and night. The problem has engaged many acute intellects ever since street lighting was introduced; and the universally acceptable solution is still to seek. It would take up too much space to go into the question here; but we promise Lord Grimthorpe that if he will form himself into a Commission of Inquiry into the subject, with a cabman, a town surveyor, and a policeman as assessors, he will have some amusement and do the State some real service. The Gas Companies will gladly help. At all events, good may result from his Lordship's reference to the subject, as it may stimulate the County Council to take prompt action in this matter, which we learn from a letter by Mr. H. Clarke in yesterday's "Times" is engaging their attention in conjunction with other subjects of cognate character relating to the public thoroughfares.

Earl Spencer on Education.

In these columns we often touch upon some salient corner of the great question of education, which must closely interest technicians of every kind and degree all the world over. One can hardly take up a newspaper without seeing in it something about education; and the voluminousness of these current Press discussions of the subject is only equalled by their inanity. We are all agreed that it is better education that the English people need; but when we proceed to details, there is great confusion of tongues. One wants this kind of instruction; another clamours for something else. No two are in agreement beyond the starting assertion that "something ought to be done." Some interesting remarks upon various aspects of this matter were offered by speakers at the annual general meeting of the Association of Technical Institutions held last week, under the presidency of Earl Spencer. The noble President drew attention to the lack of system in English educational methods, owing to which many things are done twice over, while other things are not done at all. It is unhappily the case, for instance, that, notwithstanding the existence of the Board School system and the voluntary schools that compete with it, elementary education throughout the country is in an unsatisfactory state. Sir John Gorst the other day said of the evening continuation schools that these are little more than primary schools; the pupils attending them having forgotten all they had previously learnt. There must be something rotten in the elementary school system, if this is the result produced at so much cost and labour. That it refers to a real state of things is unfortunately true in the experience of everybody. Employers of mechanical and clerical labour do not find that applicants for work are noticeably better instructed in their degree than was formerly the case, or less in need of preparation for the labour they are engaged to perform. The clerk may come from a lower stratum of society, and the errand boy show a bent for literature in the form of a halfpenny newspaper; but there is the end of it. Lord Spencer said one clever thing at the end of the day, when describing what he saw in Japan. He found at a great public school in Tokio four hundred children learning the English language. "He "thought that was an example we ought to copy." Certainly, if it means that our children ought to learn English. Perhaps this was not quite what Lord Spencer did mean; but the report reads best as it stands. There is quite a cry among politicians and public speakers for English children to be taught German, or some other foreign language—the more difficult the better—for no other reason apparently than that foreign children are taught English. Of course they are. When a child has the initial misfortune of being born to a language which is of no commercial and small literary use to anybody, the only cure for it is to learn English. It does not follow that English children need to be troubled to acquire another and less valuable tongue. Indeed, as languages are usually taught in schools, the attempt is only so much time wasted. But by all means let them learn English; and every employer will heartily join in the aspiration.

The Index to Vol. LXXII. of the "Journal," July to December, 1898, is now ready; and a copy will be forwarded (free) by the Publisher, on receipt of a post-card from any Subscriber.

The "Robert Hunter Fund."—This week there are two contributions to the fund to acknowledge—£1 1s. from X, and £1 1s. from Mr. Henry Woodall. The total amount received up to to-day is £301 8s.

The Use of Mechanical Power in Germany.—The latest official statistics of the German Empire show that there is used by the German industries a total of 3,421,194-horse power. Of this total, steam furnishes 2,715,078-horse power; the figures for water and gas being 629,065 and 53,841, and for petroleum and gasoline 7240 and 3501 respectively.

Electric Gas Lighting.—An experimental electrical laboratory recently visited by a writer in the "Electrical Engineer" was fitted with bunsen burners of the ordinary kind for heating small articles; and he states that the burners were lighted electrically. The arrangements were as follows: Over the bench, located so as to be within easy reach of the gas-burner, was fixed a copper brush, made of the frayed ends of incandescent lamp cord. This brush was connected to one side of a 110-volt circuit in series with a large magnet, wound with fine wire, and consequently having high self-induction. The bunsen burner was connected to the other side of the circuit by a wire running inside the rubber tube, connecting it to the gas-cock. Before reaching the gas-pipe, however, a short length of metal pipe was inserted in the rubber tube, and connection was made to this to avoid grounding the circuit on the gas-pipe. To light the burner, gas is turned on, and the tip of the burner is simply touched to the brush and drawn away again. The circuit is closed as soon as the burner touches the brush. When the burner is taken away, a flash ensues, because of the high self-induction of the circuit, and the gas is lit.

Water Supply from the Chalk.—The current number of the "Builder" contains the second of the series of articles commenced last month, as briefly noticed at the time, on the above subject. The writer points out that the Royal Commission of 1893 found that, taking the portion of the Thames basin lying above the intakes of the London Water Companies, the total area of chalk in it is 1005 square miles; the whole area of readily permeable material forming the surface being 713 square miles. An area lying to the east of the Kent Water Company's collecting-ground and to the west of the Medway was estimated by the late Mr. Topley at 78 square miles; while that gentleman's investigations carried out in association with Mr. R. E. Middleton showed that in the Lea Valley, above Feilde's Weir, there is an area of about 422 square miles. The Royal Commission of 1893 found that, even in very dry years, the Water Companies could calculate on obtaining at least 40 million gallons a day from wells in the Lea Valley alone; and the writer considers it was "a pity that this promising information did not suggest to the Commissioner the advisability of more closely studying the chalk areas to the north-east and south-west of that valley."

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 142.)

ALTHOUGH the great revival looked for by the Stock Exchange has not yet arrived, there was certainly an improvement in business to be remarked last week. This had a cheering influence; and markets of all descriptions assumed a firm tone. Prices all round were buoyant, and in some departments they rose considerably. Consols set a good example. One potent factor in the production of the advance was the cheapness of money, the supply of which became so superabundant that on Friday the discount houses reduced their rates on deposits by ½ per cent. It does not follow that the Bank rate will be lowered on Thursday; for the Bank frequently takes a line of its own, regardless of the outside market. But a reduction certainly becomes more probable. The Gas Market had its share with the rest in the general improvement; and business was brisker than it has been for many a week. The tendency, too, was favourable almost throughout the list. Several advances in quotation were made; and they were fairly considerable in extent. There were only one or two slight reductions. Gaslight ordinary was in good request; and, gathering strength day by day, closed firm at a nice advance in figures. The secured issues were quiet. South Metropolitan was promptly advanced to the position it was entitled to the week before. Transactions were brisk in the earlier part of the week, but died away towards the close, though there was no loss of firmness. Commercials were quite quiet and unchanged. The Suburban and Provincial group were more conspicuous than they have been of late; and some issues which had been a little depressed had a revival. Alliance, Brentford, and British recovered one or two points. Among the Continental Companies, business on the whole was no better than moderate. Imperial and Union were steady, but European showed weakness. Several of the remoter undertakings scored a moderate advance, including Oriental and Bombay in the East, and Monte Video and River Plate in the West. The Water Companies preserved their habitual repose, and quotations were mostly unchanged; but Southwark and West Middlesex had a further advance.

The daily operations were: Business in Gas opened rather quiet on Monday; the market not getting into full swing all at once. But the strong tendency was immediately apparent. Alliance, British, and Monte Video rose ½ each, and South Metropolitan 2; but ditto debenture fell 1. Greater activity set in on Tuesday with capital prices; but the only rise was ¼ in Bombay new. There was rather a lull in the activity of the market on Wednesday; but prices renewed their advance. Gaslight ordinary rose 1; and Alliance and British ½ each. Thursday offered no particular feature beyond the general steadiness. Brentford Gas moved up 2, and Southwark Water 2. On Friday, there was continued activity in Gaslight ordinary, which advanced 1. Oriental rose ¼; but European fell ½. In Water, Southwark "D" improved 3, and West Middlesex 2. The week closed with a good tendency all round. Gaslight maximum and ditto debenture improved 1 each, South Metropolitan 1, and Malta ¼.

ELECTRIC LIGHTING MEMORANDA.

The Example of Woolwich—A Warning—A Protest Against Municipal Monopolies—The Overhead Trolley Wire in Glasgow.

A HIGH degree of interest attaches to the published accounts of the Woolwich District Electric Light Company, Limited, which are given in the current number of the "Electrician." This undertaking is one of the "awful examples" of ill-advised electric lighting enterprise, of which nothing is ever heard when small and ambitious local authorities are trying to persuade the Local Government Board to advance them money for a venture of the kind. The great number of pending applications for Electric Lighting Orders are of the class to which the Woolwich speculation naturally belongs. Fortunately for the ratepayers of Woolwich, their Local Authority do not own the electric lighting undertaking; but if the clamour of the "Progressive" party in municipal politics is to be heeded, it was a sheer act of "treason" on the part of somebody to let the Company into the district. It is possible that this parrot-cry influences some weak-kneed public men in out-of-the-way places, and drives them into enterprises from which their better judgment would bid them refrain. Hence we may take the example of Woolwich for the purpose of showing that electric lighting in the small way is not necessarily a profitable business. Yet here is a place which offers a busy, well-defined, and compact area. A Company was formed with £16,000 capital, of which £10,000 was raised by the issue of £1 shares, and £6000 on 4 per cent. debentures. Practically the whole of the money was spent on plant—so prudently moreover that the capital outlay was only £42 6s. per kilo-watt capacity of the station. Nothing could be better than this; and the system of supply adopted was the high-pressure alternate current, with transformed sub-stations. Our readers will remember that the "Engineer" recently laid it down that this is the system of the future. Our own opinion is that the choice of system is usually a matter of taste on the part of the professional adviser of the undertakers.

Be this as it may, the Woolwich Company have had a very disappointing experience. Their trouble has been the serious and incurable weakness of many commercial ventures, which no amount of frugality of capital or any other administrative virtue is competent to remove—want of business. Woolwich did not need much electric lighting. Though the Company started in 1893, they only had 76 consumers on the books in 1897; and the output of electricity for the latter year was but 1·6 per cent. greater than in 1896. The point of saturation of Woolwich for electricity has thus been very soon reached. Unfortunately for the shareholders, it has been impossible to keep down expenditure on revenue account in sympathy with the dulness of trade. It cost £1827 to earn an income of £1904. This expenditure was at the rate of 5·685d. per unit; and the working profit for the year sunk from £240 in 1896, to £77 for 1897. It is a very disappointing result. Nothing has been written off for depreciation or reserve; but £204 had to be paid for interest, leaving a deficit of £105. The Directors are not yet disposed to give up the business. They have entered into various contracts for extensions and improvements of plant, among others "for the conversion of the system from high-pressure alternating to low-pressure continuous current" (strange confession!); and they mean to have another try. Altogether, the story of the Woolwich electricity supply is to be commended to the earnest attention of the responsible authorities for the numerous places which are actually on the brink of going and doing likewise. Unless these people learn wisdom, an enormous amount of wrong will be done in the aggregate to the ratepayers of small localities, which are the hunting grounds of the touting electrician.

The protests of the Associated Municipalities interested in electricity supply against the new order of electrical enterprises, which we have noticed several times of late, has evoked a startling response from the electrical trade interest, of the order familiarly known as "turning the tables." We have exhibited in these columns the pretentiousness of the Municipal interest, in regard to the setting up of a claim to the absolute monopoly of electricity supply undertaken by it in all cases by virtue of an Act of Parliament which expressly denies any such quality to its sanctions. The "Electrician" now devotes a forcible article to proving that this municipal greed of monopoly is likely to grow with what it feeds on. No less than 70 Local Authorities contemplating the obtaining of electric lighting powers are also asking for powers to "manufacture, purchase, hire, sell, and let all necessary lamps" and machinery, in the familiar phraseology. This is all very well; but, as our contemporary justly observes, one must read such demands as these in the light of the municipal policy of setting up a claim to the monopoly of everything which it takes in hand. At this rate, what is to become of outside trade and enterprise? If Municipal electricity is to be protected against competition, so will Municipal trading in every branch. The Municipal shop will always be able to "freeze out" the ordinary dealer, and thereafter exact its own prices. Moreover, where is the modern Municipality to limit itself? Already there is a movement in favour of the extension of town tramways to meet those of neighbouring towns. All this threatened expansion of Municipalism into the domain of private trade is being keenly watched by the electrical industries; and the London Chamber of Commerce are going to "see about it" when opportunity serves.

The first report has been published of the working of the Glasgow experimental line of overhead trolley tramway, which extends from near the centre of the city, in Mitchell Street, to Springburn—a distance of almost 2½ miles of double track. The electric trams began working in October last; and now the horse trams on the route have been entirely withdrawn. The fares are low; the distance being divided into four half-penny stages, and the fare for the whole distance being 1½d. The Continental system of fixed stopping points has been adopted; these stations being about 200 yards apart. There used to be a close service of horse cars; and the earnings then averaged 1s. per car-mile. Since the conversion to electric traction, the earnings have risen to 14·88d. per car-mile, part of which must surely be ascribed to the novelty. It is believed that after allowing for efficient maintenance, the working expenses will not be more than 6½d. per car-mile, if so much. The horse haulage cost 8½d. per mile. The system is to be further extended, in order to better utilize the available power at the Springburn supply station. The Committee appear to have definitely dismissed the conduit system as unsuitable for Glasgow, for many reasons. It has lately been pointed out that the conduit system, with its slots running along the streets, would constitute an additional element of danger to cyclists, whose needs are now an important consideration for highway authorities.

Institution of Civil Engineers.—The new list of members of this Institution shows a total at the commencement of the present year of 7206, as compared with 7117 twelve months ago—an increase of 89. The total is made up as follows: Honorary members, 20; members, 1973; associate members, 3945; associates, 322; students, 946—a decrease of one honorary member, but increases in the other classes of 16 32, 2, and 40 respectively.

WATER GAS CARBURETTED WITH BENZOL.

It was pointed out some years since by Dr. H. Bunte, that the extremely high value of benzol as an illuminating agent rendered it a very promising material for the carburation of simple water gas. In a paper which he presented to the German Association of Gas and Water Engineers in 1895*, he showed that in the laboratory water gas was rendered illuminative at an expenditure of 1·09 gramme of benzol per Hefner-unit-hour, when hollow-top burners, consuming the gas at the rate of 100 litres (3·53 cubic feet) per hour, were employed. This result is equivalent to a consumption of 19·18 grains of benzol per English candle per 100 litres of water gas, or of 27·14 grains per candle per 5 cubic feet of gas. These laboratory figures have now found confirmation in the results obtained by carburetting water gas with benzol on a large scale at Königsberg, in Prussia; and the doubts entertained in many quarters as to the practicability of such a method of manufacturing illuminating gas, have thereby been dispelled. The trials with benzol have naturally been pursued more enthusiastically in Germany than in this country, because the heavy import duty on petroleum and its products practically precludes the use of petroleum carburetting agents in German gas-works. Technically, however, the results are of the greatest interest to English engineers also, because they substantiate a contention repeatedly promulgated by Dr. Bunte, to the effect that it is more economical in enrichment processes to crack petroleum products into benzol and analogous aromatic hydrocarbons than to use the products uncracked or only partially cracked. Similar views as to the superiority of the benzol or aromatic hydrocarbons for enrichment purposes were enunciated, at considerable length, in a series of articles on the "Enrichment of Coal Gas," specially prepared for the "Journal," and published in 1897.† We therefore propose to give the results so far achieved at Königsberg, as published in the "Journal für Gasbeleuchtung."

It recently became imperative to secure means for considerably increasing the production of gas at the Königsberg works, which were strained to their utmost capacity in order to cope with the existing demand for gas, and lacked space for the extensions which would ordinarily have been made to meet the increase in consumption. It was true new gas-works had been arranged for; but these could not be ready for use before 1901, and in the meantime the old works were proving quite inadequate. In this emergency, Dr. Krieger, the manager of the gas-works, obtained the sanction of the authorities for the erection of a water-gas plant, which was rapidly completed and put in operation. It was at first intended to carburet the mixed gases at the outlet of the distributing gasholders; but a short experience showed that it was better to carburet the water gas before it was admitted to the holders. The water gas was produced by two Dellwik generators, obtained from the Warstein Foundry, in Westphalia; and the gas was carburetted with benzol by a Leybold carburetter made by the Berlin-Anhalt Engineering Company. The make was from 38½ to 39¾ cubic feet of water gas per pound of carbon, or about 32½ cubic feet per pound of dry coke. Each generator produced 9890 cubic feet of gas per hour; and consequently the installation was capable of yielding about 475,000 cubic feet per day. Two men sufficed to work the plant, provided the coke was conveyed to it by others. The generators could be brought into working condition in 1 to 1½ hours, even after long interruption of work.

The consumption of benzol per candle power varied according to the extent to which the gas was carburetted. When gas not exceeding 8·8 candles in illuminating power was made, about 4480 grains of benzol per 1000 cubic feet were required per candle; but when the gas was carburetted to give a light of 13 candle power and upwards, the consumption of benzol per 1000 cubic feet per candle was from 2990 to 3985 grains. The highest average proportion of water gas added for any one evening was about 17 per cent. of the mixture; and at no time was more than 20 per cent. added, though laboratory trials showed that ordinary burners could be used even when the water gas formed 28 per cent. of the mixture. The illuminating power of the mixed gas, when consumed in a 32-hole argand burner at the rate of 180 litres (6·36 cubic feet) per hour, under a pressure of 20 mm. (8-10ths), was from 14·9 to 17·5 candles. The average heating value of the mixed gas was 141½ calories per cubic foot. The mixed gas gave a higher illuminating power with incandescent lights than did coal gas. Gas-engines appeared to furnish excellent results with it, though their behaviour is now being more thoroughly investigated. The syphons at exposed parts of the distributing system did not show benzol in estimable quantity; while experiments in which water gas carburetted with benzol was subjected to frost gave favourable results, provided the gas was dry. Naphthalene stoppages have not appeared since the use of the carburetted water gas, though the other conditions have been such as would tend to produce them.

Assuming that benzol costs 18s. 3d. per cwt. (say 1s. 5¼d. per gallon), the cost of carburetting would be about 8½d. per 1000 cubic feet, and the cost of 1000 cubic feet of the carburetted water gas 1s. 2¼d. But if we take benzol at 11½d. per gallon, and water gas at 4½d. per 1000 cubic feet, the cost of 1000 cubic feet of the finished gas would be only 10¼d. An increased consumption of 12 per cent. over that of the preceding year is being met at Königsberg solely by means of the benzol-carburetted water gas. Some trials have been made there of lighting by incandescence with simple water gas; and the mantles have not shown signs of any deposit of iron on their surfaces after 100 hours' use, though the gas was conveyed through wrought-iron pipes to the burners. Further details of the interesting installation of carburetted water gas at Königsberg are promised shortly.

* See "Journal," Vol. LXVI., p. 180.
† *Ibid.*, Vol. LXX., pp. 528, 584, 633, 679, 739, 792, 844, 891, 897.

GAS BILLS FOR THE SESSION 1899.

(*Continued from p. 77.*)

The Bristol Gas Bill is to enable the Company to raise £300,000 of additional general capital stock, as sanctioned by the Company's Act of 1891. The issue of debenture stock is to be increased to one-third part of the general stock. Power is also sought for the acquisition of lands for storage purposes, and for obtaining access thereto. A clause is proposed to enable demands under £50 to be recovered in the County Court. It is desired that the statutory provisions in regard to mainlaying may be extended to pipes used for ancillary purposes. The powers of the Act of 1891, for supplying on hire gas-fittings and fixtures, are to be extended to include automatic meters, and also motors and dynamos for use in lighting or ventilating, all of which are to be exempt from distress. Other clauses deal with the laying of pipes in undedicated roads, notices to consumers, and the period of error in defective meters. A novel clause (21) reads:

"(1) Every meter, whether supplied by the Company or not, by which the gas supplied or to be supplied to any house or building is or is intended to be measured, shall be placed in such a position within such house or building as the Company shall reasonably prescribe, and so that the same shall be as near as practicable to the outside wall of the house or building nearest the road or street in which the main through which the supply is or is intended to be drawn is situate, and so that such meter, and all pipes and fittings connected therewith, shall, as far as practicable, be open to the inspection of the officers of the Company.

"(2) The Company may, by notice in writing, require the substitution for any pipes or fittings situate between the Company's mains or pipes and the meter on any consumer's premises which may in the opinion of the Company, by reason of improper material or arrangement, inferior workmanship, or insufficient size be calculated to allow of the escape of gas, or be insufficient for ensuring a satisfactory supply of gas to such premises, of pipes and fittings of such size, workmanship, and material and so arranged as the Company shall reasonably prescribe; and such prescribed pipes and fittings shall be set up, fixed, or laid under the superintendence, and to the reasonable satisfaction of the Company, and in such position as they may reasonably approve.

"(3) If any person fail to place such meter or to adopt, set up, and lay down such pipes and fittings in accordance with the requirements of the Company, the Company may cut off and discontinue the supply of gas to such premises.

"(4) No person shall be entitled to connect any meter on any premises with any main or pipe of the Company, nor shall the Company be bound to furnish a supply to such premises, unless such meter shall be so placed as aforesaid; and all pipes and fittings between the Company's mains or pipes and such meter shall be of such material and size, and so arranged and set up, fixed, or laid in such position as the Company shall reasonably approve.

"(5) Any question as to the reasonableness of any requirement of the Company made under this section shall be settled by two Justices sitting in Petty Sessions. Provided application be made to them within seven days after the date on which the requirement shall have been made by the Company."

Another clause in the Bill requires the use of anti-fluctuators for gas-engine services, as directed by the Company.

The Cambridge University and Town Gas Bill is to extend the limits of supply to include several parishes in the vicinity of the town. Additional 7 per cent. capital is required, to the amount of £75,000. The borrowing powers of the Company are to be increased to one-third of the share issue. Fifteen-candle gas is to be supplied, tested at the works. Sulphur purification is to be enforced, with 20 grains as the maximum. Demands under £50 are to be recoverable in the County Court. Additional lands are required. Special sanction is desired for the laying of an oil pipe-line from the Company's railway sidings to their works. Certain lands acquired from the Cambridge Consumers' Gas Company, Limited, are to be sold. It is desired to amend the Companies Clauses Consolidation Act, to permit of the election of a single paid Auditor. Prepayment for gas may be required in certain cases. A clause is inserted giving the Company the power of inspecting fittings in new buildings; the provisions of the section to be advertised. Tenants are to be held responsible for sub-tenants' gas bills.

The Gaslight and Coke Company's Bill declares it to be "expedient that the Company should have a further power to create and issue and to raise money by the creation and issue of £3,500,000 debenture stock," to be one with the Company's authorized 3 per cent. consolidated debenture stock. Power is therefore sought to create and issue this amount of stock, under stated conditions, one of which is that the stock must always be sold publicly by auction or tender. Stock unsold at one sale is to be offered again at a subsequent sale; and existing stockholders in the Company are not, as such, to have any preference or priority as tenderers or purchasers. Doubts having arisen as

to the power of the Company to hold certain lands, these are to be removed by retrospective enabling clauses. Additional lands to the extent of 150 acres are to be purchased by agreement, but not for manufacturing purposes.

The Hastings and St. Leonards Gas Bill is to extend the limits of supply by the Company, as defined in a schedule. Additional gas lands are to be purchased by agreement. Sanction is sought for the letting out of fittings, which are to be protected from distress by the following terms: "The exemption conferred by section 14 of the Gas-Works Clauses Act, 1847, in respect of meters, shall be deemed to include any articles and fittings supplied by the Company in pursuance of the powers of this section." As from Jan. 1, 1900, all the shares in the 1854 original capital of the Company are to be converted into 5 per cent. stock; and all the later issues are to be converted into a 3½ per cent. stock. Additional 5 per cent. stock to the amount of £250,000 is to be issued. The borrowed capital is to be made up to one-third of the stock issues. The sliding-scale is adjusted to the new classes of stock. Power is asked for the amalgamation by mutual agreement of the Company with the Bexhill Water and Gas Company. After the transfer, the Company may sell the water portion of the Bexhill Company's undertaking to the Urban District Council, and discontinue the Bexhill Gas-Works. The interest on consumers' deposits is to be reduced to 4 per cent. The use of anti-fluctuators may be required for gas-engine supplies. It is proposed to adopt the London Gas Referees' 1898 method of testing for illuminating power. Sanction is asked for an application for an Electric Lighting Order, and also for accepting the transfer to the Company of existing electric lighting powers in the district.

The Lea Bridge District Gas Bill is to extend the powers of the Company. Additional gas lands are required. The capital of the Company is to be consolidated upon a uniform 5 per cent. basis, transferable in units of £2. Additional capital to the amount of £150,000 is asked for, with power to borrow one-fourth. The sliding-scale is to be adjusted. "In the application of such sliding-scale the maximum price charged by the Company to private consumers during any calendar half year shall be taken to be the price charged in such half year." Permission is sought for hiring or purchasing railway trucks; for requiring the use of anti-fluctuators on gas-engine services; and for laying pipes, with the consent of the Local Authority, for ancillary purposes.

The Loughborough Gas Bill asks for £34,000 additional 7 per cent. capital, with power to borrow one-third. Miscellaneous clauses of the usual character include provision for making application for, and carrying out, an Electric Lighting Order.

The Lowestoft Water and Gas Bill relates mainly to the Company's water undertaking, but also purposes to raise £80,000 of additional 7 per cent. capital, with borrowing powers to the extent of one-fourth.

The St. Albans Gas Bill is to extend the limits of supply, and acquire additional gas lands by agreement. The existing capital is to be consolidated upon a 5 per cent. basis, and increased by £60,000. Borrowing powers are to be limited to one-fourth. The sliding-scale is asked for, with 4s. per 1000 cubic feet as the initial price within one mile of the town hall, and 4s. 6d. beyond, for 15-candle gas. The Company seek to be empowered to accept the transfer of the Corporation Electric Lighting Order of 1898, and to raise a separate capital of £40,000, with the usual borrowing powers, for the purpose. Certain arrangements of a novel character are to be made with regard to the determination and allocation of the profits of the electric lighting undertaking, before any capital is raised for it.

The Shotley Bridge and Consett District Gas Bill is to extend the limits of supply, sanction the purchase of additional land by agreement, and consolidate the existing capital into 5 per cent. stock. Additional capital to the amount of £36,000 is desired, with one-third loan capital. Fourteen-candle gas is to be supplied, tested on the works. Tenants are to be held liable for sub-tenants' gas bills.

The Skipton Gas Bill is to sanction the purchase by agreement of additional lands, not to be used for manufacturing purposes. The capital is to be increased by £50,000 in 7 per cent. shares, and the usual proportion of loans. The original capital bears a maximum 9 per cent. dividend. The sliding scale is asked for, with 3s. 4d. as the initial price of 15-candle gas.

The Stretford Gas Bill proposes to include the Cheshire parishes of Carrington and Partington in the limits of supply. Powers of compulsory purchase of gas lands are applied for. Additional 5 per cent. capital to the amount of £60,000 is wanted, with the usual borrowing powers. The interest on consumers' deposits is to be reduced to 3 per cent. Powers of inspection are desired for fittings in new buildings.

The Walton-on-Thames and Weybridge Gas Bill is to enable the Company to raise £35,000 of new 7 per cent. capital, carrying the usual borrowing powers. A clause is inserted to exempt hired-out fittings from distress.

The Woking Water and Gas Bill chiefly relates to water, but proposes to raise £120,000 of new 7 per cent. capital, carrying the usual borrowing powers, for the purposes of the Act and the general requirements of the undertaking. Permission is also sought for application for an Electric Lighting Order.

The Yeadon and Guisely Gas Bill is to give the Company the sliding-scale, with 3s. 6d. per 1000 cubic feet as the initial price. Permission is sought to apply for an Electric Lighting Order.

CONDUCTING EXHIBITIONS OF COOKING BY GAS.

In the number of the "American Gaslight Journal" last to hand, Mr. George W. Graves deals with the above subject in an article specially prepared for our contemporary. He begins by asking: "Does it pay to give cooking exhibitions on the lines that have been followed by the gas companies in the past?" and he immediately answers his question by expressing the opinion that "so much attention is given to preparing the food, that the gas-range gets but little show, and therefore the exhibition does not pay." He says that lady visitors attending these exhibitions generally leave them with much more vivid recollections of the comestibles produced than of what was said in regard to the cooking apparatus by which they were prepared. He goes on to ask how cooking demonstrations create a demand for gas-stoves, or show the would-be user that it is convenient, desirable, or economical to use gas for fuel. When the manufacturer of a coal cooking apparatus gives a cooking exhibition, to demonstrate the superiority of his stoves, he does not hire a professional cook to teach women how to make ox-tail soup or mince pies, but proceeds to give a practical demonstration that will show that his new construction is an improvement, and that it will do all he claims for it. The object in giving an exhibition of cooking by gas-ranges is to demonstrate, first, how quickly and satisfactorily they will bake; secondly, how conveniently and nicely they will broil; thirdly, what it costs to use them; and, finally, how to manage them to produce the most economical results.

After these preliminary remarks, Mr. Graves proceeds to show how he would set about giving a gas exhibition. He says: "Advertise that you will, at a certain time and place, during certain hours, give an exhibition of cooking by gas to demonstrate its convenience and economy. Have a number of ranges on exhibition with one or more connected with a test-meter, which should be located in a prominent place. Make an arrangement with your baker to deliver, at certain times during the day, a few pans of baking powder biscuits, and if you have two ranges that are connected with the test-meters, order a batch of bread for the forenoon and afternoon bake. But do not try to bake bread unless you have two ranges connected up so that you can show the amount of gas that is being consumed. Have a heat thermometer in the oven door if possible, as you do not want to open the door after you have commenced to bake until the article is finished. Order a few pounds of steak—the best for the purpose is that cut from the rib roast. At the hour advertised for the exhibition, show the different features of the gas-range, and proceed to demonstrate the first two objects of the exhibition."

The baking operation will be the first test applied to the range, and Mr. Graves gives the following directions for conducting it: "Have some one to take the state of the meter, another person to notice the time, then go ahead and bake not less than two pans of biscuits. When finished, let everybody pass judgment upon them. Let the meter reader state how much gas has been used, and the timekeeper give the time that has elapsed. Do not break up the biscuits and give them away, but put the time and the amount of gas consumed on a card, attach it to the product, and place the same on exhibition—meanwhile calling everybody's attention to the record. As from 15 to 20 minutes is the time required to bake biscuit, there will be no trouble in holding your audience together to see the finish; but if you are baking bread, which will require from 45 to 60 minutes, it is well to have some signed statement, showing the time of the commencement of operations and the state of the meters, so that you can prove actual results. The desirability of having witnesses to all tests is owing somewhat to the proneness of the public to doubt statements made by the employees of gas companies."

The second operation—that of boiling—is next dealt with. On this point Mr. Graves offers the following remarks: "Get your meter readers and timekeepers into line as when baking, and have a hot plate ready for your broiled steak. When finished, call attention to the time and amount of gas consumed, and then serve the steak in small portions to your spectators. (I would broil only one small steak at a time, as it is much easier to handle.) When serving the steak, it will be well to inquire how your hearers have been doing their broiling heretofore on coal-stoves, and enlarge on the results of having the kitchen full of smoke, and the house full of the fragrance of broiled meat. If there is a dealer in coal-stoves in your audience, he may not appreciate your remarks, but it will strike every housekeeper in a tender spot, and set her thinking."

Mr. Graves considers the third object of the exhibition—to show the economy of gas-stoves—is the hardest one to demonstrate. Of course, as he points out, if the exhibitor has followed directions, and is able to show what it will cost to do certain work in the oven, an estimate of the other costs can be arrived at therefrom. But to make a thorough demonstration of the entire cost, the author advises the provision of luncheon for a limited number of persons previously invited. These should comprise both sexes—the more influential the better—and by all means the representatives of the local papers; and it should be specially stated in the invitations that the parties were asked to see the lunch cooked, note the time occupied and the cost of the fuel, and pass judgment on the results. Mr. Graves gives a *menu* of such a lunch as he proposes; and he recommends that after the meal, the guests, who will know exactly the cost and the time occupied to prepare it, should be

asked to sign the card, which will make a good advertisement for the following day's paper, while the signatories will prove "travelling advertisements for gas-ranges." If the tests have been conducted properly, the fourth object of the exhibition will have been demonstrated.

The author gives the following list of things to be remembered when holding a gas exhibition: "Never open the oven door except to take out a finished baking. Every time you open the door, it takes so much more gas. Turn out the gas before removing the baking and the broiling; never take off any top cooking without first turning off the burners. Always turn down the burners when the water boils in the vessels. See that all the burner orifices are adjusted to produce the best results. Have the proper sized baking-pans, and get those that have seen service. Never use deep pans for biscuit or cookies, or anything other than tin or sheet iron for baking purposes." While he does not pretend to have covered all the details, he believes, from experience, that exhibitions conducted on the lines indicated are good investments, and will therefore prove beneficial. The thing to bear in mind is that everyone believes cooking can be done satisfactorily on gas-stoves; but it is the supposed cost of using them that causes people to hesitate in making the trial. The extravagance, however, is not in the gas used properly, but in that which is wasted from lack of knowledge or from carelessness. If an exhibitor can demonstrate that it costs no more to use gas than coal, the consumers will at once give the gas-range a trial. One summer's experience should, if they have been properly instructed, and have a first-class up-to-date range, lead them to substitute a gas-range for the old-fashioned, expensive coal-stove. This, says Mr. Graves, is the objective point to strive for.

WATER COMPANIES' RESPONSIBILITIES FOR PURITY OF SUPPLY.

In view of the circumstances attending the outbreaks of typhoid fever at Maidstone and King's Lynn, already recorded in the "Journal," and the subsequent action of the Local Government Board with the view of protecting sources of water supply from pollution, special interest attaches to the important case of *Green v. Ashland Waier Company*, which has lately been decided by the Supreme Court of Wisconsin. It was an action brought by the plaintiff, Mrs. Julia L. Green, to recover from the defendants compensation for the loss of her husband, whose death from typhoid fever she alleged was caused by their neglect to extend their intake into Chequamegon Bay in order to obtain a supply of unpolluted water. The following particulars in regard to the case are taken from the "Engineering Record."

The Court of First Instance decided that the Company were not obliged, under their franchise, to go outside of Chequamegon Bay for a supply of water; and this opinion has been upheld by the Supreme Court. In the first-named Court, the following questions were submitted to the Jury: Could the defendant Company have procured wholesome water from Chequamegon Bay at and prior to the sickness of Green? Were the Company guilty of negligence which was the proximate cause of his death? Did the defendants know, or ought they reasonably to have known, prior to the time when the deceased contracted the disease from which he died, that the water they furnished was contaminated by typhoid germs? The Jury answered each question in the affirmative, and awarded the plaintiff $5000 damages. From this decision the Company appealed. As the plaintiff's case was argued, the decision rested on whether the evidence warranted the finding that the Company failed to procure a pure water supply from the bay. The opinion of the Supreme Court on this point is: "We have searched the record from beginning to end, and read and re-read it with the greatest care, to find such evidence, and have failed. The point was raised in the appellants' brief that no such evidence exists; and no reply thereto appears in the brief of the respondent. No evidence is pointed out on which the finding can rest." The only information on the subject was found in an unsworn report of a chemist, based in part on an unverified report of an examination, by another party, of several samples of water taken some time after the occurrence complained of. The only sample free from sewage contamination was taken two miles from the pumping-station; and the chemist who made the report did not place sufficient reliance on this result to recommend drawing water from that place. He thought a supply might be found there with reasonable certainty, but expressed a preference for going outside of the bay entirely. All the sworn evidence in the case shows that pure water was found on one occasion at a particular place; and this condition might or might not continue; and that the bay water was so generally contaminated with sewage, especially in the spring, that a safe supply could not be found there with any reasonable certainty.

Nearly a year prior to the death of Green, the officers of the Municipality and the Company were of one mind as to the necessity of going outside the bay to get water suitable for domestic use. In February, 1893, a report was adopted by the Common Council requesting the City Attorney to frame a resolution formally directing the Company to extend their intake so as to draw water from the lake rather than from the bay. In the following April, such a resolution was drafted by the Board of Health, and adopted by the Council, and an attempt was afterwards made to condemn the water supply, and annul the franchise, because the Company did not go to the lake with their intake.

The Supreme Court considered it clearly established that all parties understood for nearly a year prior to Green's death that the bay water was unsuitable for domestic use. During this time there was a contest between the Municipality and the Company as to whether or not the latter were obliged to extend their intake to the lake. This being the situation between the primary parties to the contract, the Supreme Court ruled that the situation "could not be different as to private persons who became parties thereto by claiming the benefit of the contract." They further decided as follows: "The verdict of the Jury on the point here considered appears to be contrary to the evidence; and if a recovery on the record depends on that question, the verdict should have been directed for the defendants, and the judgment appealed from cannot stand."

While the Jury awarded damages to the plaintiff, they nevertheless said, by another finding, that prior to Green's death it was widely believed among the citizens of Ashland that the cause of the typhoid fever epidemics in the city was the impure drinking water furnished by the Company. It requires only a passing acquaintance with the principles of the law to know that the doctrine of contributory fault can be resorted to in such a case to shield a defendant, and the importance of this principle in such a case of water pollution is evident from the following extract from the Supreme Court's opinion: "In view of the facts, which we deem uncontroverted by the evidence, that after the water was impure, and such condition had existed for a long time and was widely and commonly known, the findings referred to are inconsistent; there being no evidence explaining why the deceased did not know that which was a matter of common knowledge in the community where he lived. Common knowledge of a fact raises a presumption that all persons of average intelligence have notice of it. That is elementary. Not only was there no proof to justify the Jury in saying that the deceased did not have reasonable ground to believe what they said was commonly known and believed, but there is much affirmative evidence to the contrary. He knew that the sewage of the city was drained into the bay, and that the defendants' water supply was taken therefrom. He was an intelligent, reading, working man. He took one of the city papers, wherein the dangers of taking water from the bay were discussed. He had typhoid fever in his family six months before he was stricken—his wife being the party. She was attended by one of the plaintiff's witnesses, who was thoroughly conversant with the condition of the defendants' water supply, and who probably talked with the deceased on the subject, as he did with intelligent men generally—it being a matter of common talk. All these facts are in evidence. It is not deemed advisable to quote the evidence at length; suffice it to say that the proof is overwhelming to the point that the bay water was dangerously polluted at the time Green was stricken with the fever, and that it had been in that condition, especially in the spring, for several years. The facts in this regard were understood in the city generally, and had been the subject of discussion at public meetings, in the City Council and the newspapers, and among the people, for a long time. There is no evidence in the record to abut the presumption that deceased had notice of what was so commonly known. So we cannot escape the conclusion that the verdict of the Jury on the subject of Green's contributory fault is without evidence to support it, and that the contrary is established by the evidence. For this and the other reasons mentioned the judgment appealed from must be reversed."

Our contemporary points out that this portion of the decision is in line with the arguments of Counsel on the subject; but on account of the unique character of the action, the Supreme Court discussed it under a different aspect of law, involving the so-called rule of implied warranty in the sale of provisions for immediate domestic use. What this rule means is stated as follows by the Court: "'The doctrine of Sir William Blackstone, that there is a warranty of the wholesomeness of provisions sold for domestic use to the buyer, and that the vendor is bound to know their quality in this regard at his peril, is controverted by the weight of authority in this country and in England. Liability for damages in the circumstances mentioned is supported, but on the ground of deceit, not contract." No reason could be found by the Court for saying that a mere distributor of water for a compensation should be held liable as a guarantor of its quality. "Water is not a commodity kept for sale, in the strict sense of the term. The immediate source is usually selected in advance, and fixed by contract, as in this case; leaving simply the service of a carrier to be performed. To say that the person or corporation shall be burdened with an implied warranty of the quality of the thing carried and distributed would be treating the transaction as a sale, strictly so-called, "and then applying an exception of the doctrine of *caveat emptor*, not supported by good reason or any authority we are able to find, or any to which our attention has been called." The decision of the Supreme Court dwells strongly on this point. To require such a guarantee, it says, in substance, would put a destructive burden on private water companies, and render the operation of public works so fraught with danger as to discourage a service

that has become a necessity in all our communities. All that can be reasonably asked is to hold water companies strictly accountable for the exercise of ordinary care not to place before customers an unwholesome article under circumstances liable to induce persons, exercising ordinary care to use it for domestic purposes. Reasoning on this line of argument, the Court arrived at the following decision.

"From the foregoing, it will be seen that if a recovery can be sustained on the facts of this case at all, it must be on the ground of actionable fraud or negligence, without contributory fault on the part of the deceased. If the defendants knew, or from their situation ought to have known, that the water they were distributing in the city of Ashland was dangerous for domestic use from some cause not discoverable by the exercise of reasonable care, they owed the duty to their customers of disclosing this danger; and a failure to do so, knowing that such customers were liable to use the water through ignorance of its character, was a fraud in law, rendering them liable to legal damages to any person injured through such fraud without fault on his part. It was also a failure of duty, amounting to actionable negligence as well, to which the same liability is incident. The mere fact, if it be a fact, that it had been rendered impracticable for the defendants to procure a supply of wholesome water in Chequamegon Bay, as required by the contract with the city, from causes attributable to the Municipality, though constituting a defence against any action on the part of the city, does not excuse knowingly pumping contaminated water from the bay, distributing the same to customers, and deceiving them into the belief that it was wholesome. But, as indicated, though the conduct of the defendants be held wrongful on the ground of either fraud or negligence, if the deceased knew, or under the circumstances ought to have known, the dangerous condition of the water, and yet used it with the consequence complained of, no legal liability thereby attaches to the defendants. If the deceased knew—and he is charged with knowledge of what a man under the circumstances ought to have known—then he was not deceived, whatever may have been the conduct of the defendants; and for the same reason he is chargeable with contributing to the result complained of by his own want of care."

OBITUARY.

The death of Mr. JOHN O'FARRELL, the Outdoor Superintendent of the Walsall Gas Department, was announced at the meeting of the Town Council yesterday week. He had been in the service of the Corporation upwards of 22 years.

We regret to record the sudden death, on Friday last, of Lieut.-Col. ROBERT PRINGLE, M.D., whose name will be familiar to many of our readers in connection with the "Omedwâr" gas-stove, which he designed in conjunction with Mr. Robert Morton, the principle of which, it may be remembered, was the employment of clusters of small flat-flame burners working under cover in a heated atmosphere. The stove has been described in our "Register of Patents," and the details of its construction were discussed in an article which appeared in the "JOURNAL" on Aug. 11, 1896. Deceased was a retired Brigade-Surgeon of the Indian Army.

We regret to record the death, which occurred yesterday week, of Mr. R. I. WATTS, a Director of the Devonport Gas Company. Mr. Watts, who was upwards of 80 years of age, was a member of the Devonport Town Council from 1885 to 1895, was elected Mayor in 1889, and filled other public offices in the town. He continued to take an active interest in the business of the Gas Company until very shortly before his death, which his colleagues heard of with much regret. At a meeting of the Town Council on Thursday, the Mayor (Mr. W. Hornbrook) spoke of Mr. Watts' services to the town in the various public offices he had filled; and a resolution of sympathy with the deceased gentleman's family was passed.

The Thames as a Salmon River.—A very interesting paper on "The River Thames" was read at a recent meeting of the Auctioneers' Institute by Mr. Walker Simms, who brought out a curious "fact" in connection with the disappearance of salmon from the stream. He said that probably the last known instance of a salmon being captured in the Thames was that mentioned by Mr. Stuart Moore; a fish having, according to him, been caught near Monkey Island in 1823, and sent to the King at Windsor. Mr. W. H. Grenfell, of Taplow Court, Maidenhead, who had favoured Mr. Simms with a long letter on the subject of his paper, stated that "salmon disappeared from the Thames at the same time as gas lighting came in;" and he cited in support of the statement the Rev. G. Venables, who had connected the two events. This points to the evil effects resulting from the discharge into the river of gas-works refuse. But it is pleasant to find that great improvements have taken place since that time, and that now, quoting Mr. Grenfell again, "the river is so much cleaner than it was thirty years ago," as proved by the re-appearance of delicate fish in the tideway. Mr. Simms hoped that his audience might live to see the day when "our noble river once more rendered its proper service in ministering to our necessities, convenience, profits, and pleasures."

PERSONAL.

Mr. CLEMENT A. CUNNOLD, who was recently admitted as an associate member of the Institution of Civil Engineers, has been appointed an assistant to The Gaslight and Coke Company. Mr. Cunnold was a pupil of Mr. W. A. Valon.

At the monthly meeting of the Institution of Civil Engineers last Tuesday, it was announced that Mr. ISAAC CARR, the Gas and Water Engineer of the Corporation of Widnes, had been transferred from the class of associate members to that of members.

The officials and workmen of the Newbury Corporation Gas-Works last Saturday presented Mr. R. M. COUPER, the retiring Manager and Secretary, with a gold albert chain and locket, accompanied by a framed illuminated address, as a small token of the sincere esteem they had borne towards him during his management. Regret was expressed at the severance of the pleasant connection which had existed; and good wishes were offered for Mr. Couper and his family in the future.

At a recent meeting of the staff at the Redhill Gas-Works, farewell honours were unanimously paid to the retiring Superintendent, Mr. W. R. DAVEY. The warmest appreciation of his unfailing attention and courtesy was expressed, coupled with best wishes for his future health and happiness. The presentation of a handsome barometer was also a token of the esteem in which he was held. Mr. Davey entered yesterday upon his new duties as Manager and Secretary of the Newbury Corporation Gas Department.

Mr. GEORGE KEILLOR, jun., Assistant-Manager of the Hamilton Corporation Gas-Works, was last Wednesday appointed by the Peterhead Gas Commissioners to be Manager of their works, in succession to Mr. J. Kincaid, who has removed to Falkirk. There were seventeen applications for the post at Peterhead, but only two names—those of Mr. Keillor and Mr. G. M. Milne, Assistant at the Peterhead works—were submitted. Mr. Keillor obtained the appointment by seven votes to five. He is quite a young man. His education in gas making was received in the works of his father (Mr. George Keillor, of Nairn). About five years ago he was appointed to the post at Hamilton, which he has held ever since. At a meeting of the Hamilton Corporation last week, Mr. Keillor's resignation was accepted; and testimony was given as to his ability, and the efficient manner in which he had discharged his duties.

NOTES.

Light Without Energy.

A note in the "Comptes Rendus" describes the remarkable new body called "radium," recently discovered by M. and Mdme. Curie. It has already been shown how, by purely chemical processes, a strongly radio-active substance can be extracted from the mineral pitch-blende. The conclusion was accordingly drawn that pitch-blende might contain a new element, for which the name of "Polonium" was proposed. Subsequent researches have confirmed this discovery; but, concurrently with the confirmation, there has come the disclosure of the existence of another strange body, also strongly radio-active, but differing entirely from the first body in its chemical properties. The method of separating the new substance, which is very like varium, is described. Examined spectroscopically, it yields a ray not referable to any known element. It is believed that the radio-activity of the new substance is enormous. It is one of those substances which render air a conductor of electricity and act photographically on sensitive plates. Uranium and thorium do this; but radium and polonium are much more active. These elements render barium platinocyanide fluorescent in the dark. Hence at last the world is put in possession of a source of light (very faint as yet, it is true) which functions without a source of energy. The effect is sufficiently remarkable to merit being recorded, as it is one step further into the mystery of matter. As usual, the fact upsets all preconceived ideas, and contradicts apparently established theory.

Gas-Engines on Motor-Cars.

The "Engineer," though unable as yet to evoke a wholly satisfactory road motor-car, continually discusses the subject in the praiseworthy spirit of helping the builders of these vehicles to the selection of hopeful designs. Recently, it has undertaken to criticize the oil-engine from the point of view of the road-motor builder. The actual state of this business is very peculiar, and not a little instructive. The road motor-car is confessedly in the throes of the evolutionary process, which may or may not eventually produce a practically perfect machine. It is one of the standing criticisms of all theories of evolution, that the intermediate stages offer a difficulty as regards their utility. Who has any use, it is asked, for an imperfect organ, or a defective member? The actual road motor-car offers a partial solution of this problem. They are not really successes; yet the motor-cars of the day do answer a certain, though limited and provisional, purpose. They are good enough for those who like novelty, or notoriety, and who do not mind paying for the sensation. As such, they serve to show how much remains to be done before a really serviceable mechanical motor-car appears. Cars

driven by oil—that is to say, by gas—engines bulk largely among these provisional vehicles. The power of an explosion engine is, roughly, in proportion to its speed. It is neither self-starting nor reversible; and it requires some kind of variable gearing. The latter is not an easy thing to find. Explosion motors also need a heavy fly-wheel, which introduces other limitations. The "Engineer" thinks that the possibilities of these motors are far from being exhausted, but holds that, in order to enable the vehicles to be properly under control, it would be a great convenience for the engines to be capable of starting without manual labour.

The Lamp-Columns of the New Vauxhall Bridge.

The accompanying drawing, from an illustration published in the "Builder," shows on a small scale the kind of lamp-post which is to be used on the new Vauxhall Bridge, shortly to be commenced after the designs of Sir A. R. Binnie, Engineer to the London County Council. The old Vauxhall Bridge is now being demolished; and soon its site will know it no more. Happily, of late years a sense of responsibility for the worthy treatment of the River Thames in the matter of bridges has grown up in the Metropolitan governing authorities; and the new Vauxhall is meant to be a proof that even the London County Council can be artistic when it likes. For the present purpose, it is sufficient to state that the bridge is to be built in five spans, and to be 80 feet wide between the parapets. The lighting is to be by a type of lamp-post more familiar to French than to English engineering practice; being after the style of the "rostral columns" of the Place de la Concorde and outside the Opéra. The idea is that of a massive column, to which the actual gas-lamps are attached by secondary brackets. In the present case, the "Frenchiness" of the style is very evident; while an attempt is made to follow the tradition of the older Embankment lamp-posts by putting the well-known intertwined dolphins on the top of the "rostral column," as a finial. Those architects who were not consulted in regard to the work, will be sure to poke fun at these lamps. We are now concerned with the fact that the light-centres, being concentrated at the piers (which are to be 144 ft. 6 in. apart), will afford but a "spotty" lighting effect at best. The rostral columns are very good in their way; but they will be too far apart. There will have to be smaller lamp-posts at the centres of the arches.

TECHNICAL RECORD.

MAKING THE GAS BUSINESS PAY.

In the "JOURNAL" for the 13th ult. we briefly noticed the paper on the above subject read at the last meeting of the American Gaslight Association by Mr. A. E. Forstall, of Montclair (N.J.). The communication, which led to a brisk discussion, was of sufficient interest to justify reproduction in full.

In the early days of the gas industry, little attention was paid either to reducing the cost of manufacture or to developing the business. Later, great stress was laid upon the necessity for economizing as much as possible at the works, and bringing down the cost in the holder to the lowest practical point; but the sales department was still apathetic. Only during the last decade has this department awakened to the fact that in the gas business, as in all others, the only way to sell any large amount of goods, and keep ahead of competitors, is to advertise your wares—seeking possible purchasers to present to them the advantages of your goods, and demonstrating to them the benefits to be derived from patronizing you. In the present condition of the industry, there can hardly be any doubt that, of equal amounts of energy applied in a well-equipped plant, respectively, to the decrease in the cost of gas in the holder or the increase in the amount sold, that given to the latter purpose will yield the larger returns in increased profits. But in striving after new business, we may lose sight of other points connected with the sales department that would repay consideration. Is it not possible that we are doing business that is not profitable—in fact, is not every company doing some business at an actual loss? And cannot a way be found to make this business profitable?

In an article entitled "Both Sides of the Ledger,"* Mr. N. H. Humphrys, of Salisbury, emphasizes the necessity of a careful examination of all the circumstances connected with each class of consumers, to determine its desirability and the extent to which it should be encouraged, and also to settle the question of what concession in price, if any, can be fairly granted for such encouragement. He notes the various factors affecting cost of service, such as the constant or intermittent nature of the demand for gas, the relation of time of maximum consumption to the peak of the load, which determines whether the particular business under consideration increases or diminishes the "load factor," the proportion between the size of meter required and the total amount of gas consumed in a year, and other more obscure factors to which it is hard to assign definite values. But, though calling attention to the necessity of care to avoid unprofitable business, he gives no advice as to the way in which business that is shown to be unprofitable by an examination based on his line of thought can be made profitable.

A key to the solution of the problem is given, however, by Mr. Walton Clark, in the paper entitled "Meter-Rents: A Question of Equity and Policy,"* read before this Association in 1891. In that paper the point is made that gas companies being granted certain rights, having their origin in the citizens of the State, these rights involved obligations to the public granting them, one of which is to make no distinction in their treatment of individuals served by them. In other words, no gas company is entitled to "collect upon the investment necessary to the service of one customer an interest greater or less than is paid by any other customer upon the investment made in his behalf." Decisions of various cases in the United States Circuit Courts are cited as showing plainly that the profit made by corporations organized to do a public work must not be variable per unit of service rendered. From these premises, Mr. Clark reasons that the equitable way of charging for the service furnished by a gas company is "to charge for each 1000 cubic feet of gas an amount covering its proportion of the items of expense and interest common to the performance of the total service; adding to each bill so made the items peculiar to the individual service." The first portion of the charge should include the cost of supplying up to the inlet of the service-pipe, including the amount per 1000 cubic feet necessary for the payment of interests and dividends; and the second should be made up of the average cost of keeping the accounts, collecting the bills, and attending to complaints, *plus* the interest and maintenance charges for the meter and service-pipe employed for the particular consumer under consideration. Mr. Clark thought that while a change from the present method of charging so much per 1000 cubic feet, with various discounts for amounts above the average, to the method he advocated, would at first lead to friction with the consumers, in the end the easily demonstrable justice of the new method would ensure an increase of popularity to the company adopting it.

At the time of its reading, this paper did not receive the attention it merited. Questions of business method had not then assumed the importance that has since been accorded them, and did not command the consideration given to problems arising on the technical side of the industry. But its arguments were strong; and they have lost none of their strength in the interval that has elapsed. Being a new-comer into the field of office work, the number of small consumers served at a direct loss to the company probably made more impression upon the writer than would have been the case had he grown up at the desk. Be this as it may, he was so much impressed that the subject of either doing away altogether with such consumers, or devising some method to make them profitable, has occupied a large share of his attention; and the more thought was put upon it, the more it seemed advisable to follow the plan worked out by Mr. Clark, and to a certain extent applied by the electric companies in their system of minimum charges, and charge a certain amount for cost of service irrespective of the quantity of gas used.

In order to see how the change would affect our consumers, an analysis of the expenses was made, and the cost per consumer of keeping the accounts, collecting the bills, attending to complaints, &c., was determined. The meters were also listed by sizes and amounts registered in 1897—that is, so many 3-light meters under 1000 cubic feet, so many between 1000 and 2000 cubic feet, and so on. For the purpose of this investigation, it was not deemed necessary to take up each length of service, but only to take the average cost of maintenance. And the services having all been paid for by the consumers, no interest on their cost was figured—maintenance only being considered. In the absence of definite figures for the cost of such maintenance, it was assumed at 30 c. per annum per average service of 60 feet in length. Interest, depreciation, and repairs on meters were figured at 15 per cent. on the first cost. Working out the charges on this basis, and taking all the figures in round numbers, it was found that the costs of service per annum were as follows: 3-light meter, $2·25; 5-light, $2·50; 10-light, $2·90; 20-light, $3·30; 30-light, $3·80; 45-light, $4·90; 60-light, $6·20.

Fixed charges of these amounts made upon the respective consumers would bring in a sum of money sufficient to enable us to reduce the price of gas 12 c. per 1000 cubic feet, and still net the same profit. Making this reduction in the price of gas, and adding the charges, would cause all consumers of less than 19,000 cubic feet per annum through a 3-light meter to pay more for their gas than at present; while those consuming more than

* See "JOURNAL," Vol. LXXI., pp. 22, 75.

* See "JOURNAL," Vol. LVIII., p. 990.

that amount would pay less. For a 5-light meter, the dividing-line would be at 21,000 cubic feet per annum; for a 10-light, at 24,000 cubic feet; for a 20-light, at 28,000 cubic feet; for a 30-light, at 32,000 cubic feet, &c. With our conditions, the change would result in 63 per cent. of our consumers paying more for gas than they do at present, and in 37 per cent. paying less. In the case of the 6½ per cent. of meters that are passing from 100 to 3000 cubic feet per annum, the increase in price might be so great, when figured at per 1000 cubic feet, as to cause the closing of the accounts; but as this business is now done at less than the actual cost of doing it, its loss would not be a source of regret. However, even among this last there are some meters that would be retained, as the additional charge of $2 or so yearly would be paid for the privilege of having gas to fall back upon in case of a failure in the electric light service. But in most cases the increase would be so small that it would hardly be noticed. Our figures show that of the 63 per cent. of consumers paying more, only 27 per cent. would pay over 10 c. per 1000 cubic feet or $1 per annum additional for the same amount of gas—a difference that would not attract any attention. On the other hand, the larger consumers would individually derive a much greater benefit, since the loss of 63 per cent. is gained by 37 per cent. The largest consumer through a 3-light meter who burnt 79,000 cubic feet would save $7·23 by the change; and the largest consumer through a 5-light meter burning 129,000 cubic feet would save $12·98 per annum.

While an increase of price to 63 per cent. of the consumers might at first sight seem very poor policy, if the change of method were made, as Mr. Clark suggests, simultaneously with a reduction of price independent of that due to the change, it would certainly be so arranged that there would be no actual increase except to the 6½ per cent. of consumers above noted who are burning little or no gas, but merely retain the meter as a convenience. There certainly can be no question as to the greater equity of the plan proposed compared to that now in vogue; and there does not seem to be any legal obstacle in the way of its adoption, except possibly in the case of those companies operating under franchises, municipal or otherwise, limiting closely the price to be charged per 1000 cubic feet. It would not be possible to apply a fixed charge without making the cost per 1000 cubic feet to some consumers greater than the price fixed by law, and this might prevent its adoption in such cases. But the majority of companies are not bound in this way. They are free to arrange their charges in any manner that is just and reasonable. Can there be any way more just and reasonable?

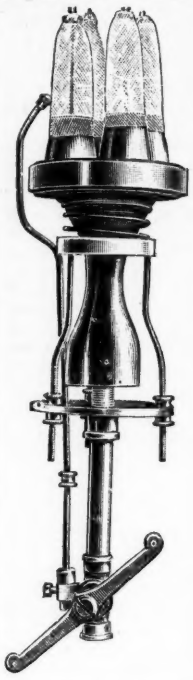
Apart from theoretical arguments, have we not a very practical one in the custom of electric light companies? The Company that controls the supply of electricity in our part of New Jersey will not instal a meter unless the would-be consumer signs an agreement to pay at least $1 per month, even though, as may frequently happen in summer, no current is used during the month. They get business, and are apparently making money. It would seem as if a charge of this kind, that appears to make the customer pay for something he is not getting, would be more objectionable than a charge for cost of service that is being rendered. And what is sauce for the electric goose should serve as well for the gas gander

If, then, the proposed system of dividing the charge for gas into the two items of cost per 1000 cubic feet for expenses that are common to all consumers, and not dependent upon the number, and the fixed charge for expenses that are peculiar to the individual consumer, and independent of the quantity consumed, is more equitable than the present plan of a single item of so much per 1000 cubic feet, combining both general and special expenses in a common average price under which no two consumers pay the same amount for equivalent service, and the change, if properly timed, can be made without detriment to the popularity of the company, what argument can there be against its adoption? And if, as would seem to its advocates, the change would increase the popularity of the company, while making all its business equally profitable, instead of this being done partly at an actual loss, partly at a small profit, and partly at an excessive profit to balance the losses, there would seem to be very strong arguments in its favour.

The method outlined is not perfect. Among other things, it does not recognize the difference between a certain consumption at a time of light load, as during the day in summer, and the same consumption at a time of heavy load, as in the evening in winter, though the former can certainly be supplied more cheaply than the latter. This can be met by differences in the charge per 1000 cubic feet for gas used at the various times, the fixed charges remaining the same, and separate meters being installed; or it can be ignored, as is the case with many companies at present. But, though it does not cover all factors affecting cost of service, the proposed method of charging does away with all differences between users of gas for the same purposes, and substitutes for present arbitrary extra discounts to large consumers a perfectly fair and equitable premium to those who keep their meters working up to nearly full capacity. And it is again presented as an advance upon the crude method of charging which originated during the "dark ages" of the industry, with the idea that the present writing may supplement the original presentation, and in connection with it persuade us all to enter without delay upon, and follow closely the path of "equity and policy."

IMPROVEMENTS IN ANTI-VIBRATORY GAS-FITTINGS.

In the "JOURNAL" for the 13th ult. we noticed several of the improvements in anti-vibratory fittings for incandescent gas-lights which have been introduced by Messrs. Clay and Walmsley, of Bolton. Allusion was then made to the "floating bunsen" fitting, which consists simply of a wire frame, at the bottom of which is attached a cone; the frame being also provided with sensitive springs to give the resilient effect. In order to adapt this anti-vibrator to an incandescent burner, the nipple of the burner is screwed on to the existing gas-pipe in the lantern, while the bunsen from which it is taken is screwed on to the cone. One form in which a simple arrangement of the appliance may be used is that of a street-lamp, for the purpose of suspending thereon one of the ordinary "C" burners, though any other kind of incandescent gas-burner can be similarly treated. Another form of the fitting is shown in the accompanying illustration, from which it will be seen that four mantles are mounted on one bunsen; but it is only a question of size to allow a larger or smaller number of mantles to be fitted in a similar way. All the mantles are supplied from one jet; but a further design is in preparation in which several mantles are supplied independently through one body, so that one or more of their number may be used separately from the others. It is claimed for these inventions that they are absolutely fireproof, the rubber attachment in some fittings of this particular class, and which is so much condemned by certain fire insurance companies, being altogether dispensed with.



A Quarter of a Century's Progress in the Gas Supply of Glastonbury.—In the course of the review of the events of the past year which appeared in a recent issue of the "Central Somerset Gazette," the circumstance that the Manager of the Glastonbury Gas Company (Mr. J. H. Hopper) completed his 25th year in their service on the 9th of November received well-merited recognition, for during this period the improvements which have been effected in the lighting of the town have been very marked. When Mr. Hopper took the control of the works, the consumers paid 7s. 6d. per 1000 cubic feet for their gas, and had only a moderate light; whereas now they pay 3s. 6d. to 4s. 6d. per 1000 cubic feet for what is characterized by the writer of the article as "some of the best gas in the West of England." We quite agree with him that such a comparison speaks volumes for Mr. Hopper's management.

Gas Consumption in Birmingham.—The recent gas consumption in Birmingham, especially in the few weeks preceding Christmas, has not been so large as in some former seasons. The records of the Corporation Gas Department are made up to the Thursday in every week; and during the week ended Dec. 22, the quantity of gas used was 162,853,000 cubic feet, as compared with 165,724,000 cubic feet during the week ending Dec. 23, 1897, or a decrease of about 1¾ per cent. This year, foggy or frosty weather did not contribute to increase the demand. Besides, the comparison is scarcely a fair one, because every day up to Christmas the demand for gas increases; and therefore the supply was somewhat less on the present occasion by reason of the weekly return being made up a day earlier than was the case in the previous year. In the following week, ending Dec. 29, the consumption was 130 million cubic feet, or about 9 millions more than in the corresponding week of 1897. The extraordinary drop from 162 millions to 130 millions was occasioned, as in the previous year, by the fact that the second week included not only Christmas Day, but a Bank Holiday, when the demand would fall far short of an ordinary working day. During the half year ended Sept. 30 last, the total quantity of gas consumed showed an increase of rather more than 3 per cent. when compared with the corresponding period of the previous year; and it is believed that for the Christmas quarter there has been an increase over the corresponding period of 1897.

The Lighting of the Added Area of Devonport.—The Surveyor's Committee of the Devonport Corporation have had some correspondence with the Devonport Gas Company respecting the lighting of the districts of St. Budeaux and Pennycross, recently added to the borough. The Company informed the Committee that they were prepared to supply gas for public lamps and private consumers in these districts at the same price as is charged in the old area of the borough, if the Corporation would defray the expense of providing and laying the necessary mains and services. The Committee declined these terms, and directed the Surveyor to report as to the best mode of lighting the district otherwise than by gas. When the matter came before the Town Council last Thursday, the Town Clerk (Mr. A. B. Pilling) explained that the Corporation were the lighting authority for the added area. The Company had no right to go outside the borough without the consent of the Council; and the Surveyor's Committee, in making the offer to the Company, considered it only fair and reasonable to expect to make something out of it, instead of having to put their hands in their pockets. A member of the Electric Lighting Committee intended to bring forward a proposal that the added district be lighted with electricity, and the Surveyor had been instructed to report upon the proposal. Alderman Brooming asked if the Plymouth and Stonehouse Gas Company had been approached on the subject. The Town Clerk said he would answer that question privately, if Mr. Brooming desired.

REGISTER OF PATENTS.

Preparation of Calcium Carbide.—Gearing, E., of Harrogate. No. 2997; Feb. 5, 1898.

In preparing calcic carbide according to this invention, it is mixed with (say) coal tar from which any water present has been previously evaporated or expelled. The mixture is stirred until the mass becomes more or less plastic, when it is pressed into moulds. The blocks or briquettes thus formed are then heated in an oven or muffle until the coal tar is decomposed, and the calcic carbide remains held together by porous residual carbon from the coal tar.

In carrying out this treatment, the coal tar may be conveniently boiled in a suitable vessel until all water is driven off; and the calcic carbide is then added to, and intimately mixed with, the boiling tar, until the mass becomes so thick that it can only just be stirred.

In the usual method of manufacture, says the patentee, calcic carbide is produced in the form of hard and tough ingots of considerable size, which have to be broken into convenient pieces before being used in acetylene generators—the breaking causing "great waste, owing to a considerable quantity of the material being unavoidably crumbled or powdered." By this invention, however, the crumbled or powdered calcic carbide, either mixed with broken pieces of calcic carbide or not, is converted into blocks or briquettes, which are said "to be superior to lump or untreated calcic carbide for use with acetylene generators, as the gas is evolved in a very steady current, and comparatively little heat is caused by chemical action during generation."

Feeding Gas-Engines with Carburetted Air, and Re-Carburetting the Burned Products.—Mathieu, C., of Brussels. No. 3185; Feb. 8, 1898.

In the first place, this invention consists in the combination of an air-carburetter with a "gasificator" of great surface, heated by the burned gases of the engine. The air is drawn in by the engine itself (through filtering layers of cotton, moistened by a mineral oil), with such velocity as to reduce the oil to a fine "dust," the condensation of which is prevented by the gasificator; thereby producing "a rich and dry gas, in which the proportion of oxygen is too small for rendering the gas explosible without further addition of air."

In the second place, the invention consists in the re-carburetting of the burned products of gas-engines, by leading them into an expansion vessel, where they can fully expand, so as to conserve only the pressure and heat required for getting through the re-carburetter, and for maintaining there a temperature corresponding with the external air.

As the quantity of the burned products and the rate of consumption of the re-carburetted gases are variable, the process is completed by a regulator, which consists in the combination of the re-carburetter with a bell or gasholder, which, by means of a bar, chain, or string, actuates a three-way valve, slide, or cock in such a manner that, as soon as the gas raises the bell, the latter will gradually shut off the passage leading the burned products to the expansion vessel, and open at the same time the passage for the escape of the products into the atmosphere.

Purifying Acetylene.—Etaix, L., of Paris. No. 3914; Feb. 16, 1898. Date claimed under International Convention, Aug. 14, 1897.

The removal of the phosphides of hydrogen and sulphuretted hydrogen which acetylene contains on generation is attained by acting upon the gas by means of chloride of lime of commerce (whether in the solid state or in solution), or any other hypochlorite of an alkali or alkali-earth. In the one case, the chloride of lime is spread out in a chamber traversed by the acetylene gas to be purified, upon superposed shelves or trays, for instance, or it may be employed in bulk if mixed with pumice stone or other inert porous substance, to prevent the consolidation of the material. In the other case, the solution of chloride of lime (or of any other hypochlorite of an alkali or alkali earth) is placed in a washer, and the gas is caused to pass through it.

The acetylene, on being brought into contact with the chloride of lime, or in traversing the solution, becomes freed from phosphoretted hydrogen and other phosphides of hydrogen it contains by absorption, followed by oxidation, which has the effect of destroying the phosphoretted hydrogen and sulphuretted gaseous products—the oxidation products combining with, and becoming fixed by, the alkali or alkaline-earthy base. The gas thus purified should then be freed from the chlorine vapours or compounds which it may have taken up, by being passed over or through a lye of caustic soda or caustic potash.

The "invention" claims to "reside in the process described, and is independent of the apparatus employed for effecting the passage of the acetylene over or through the solid substances or solutions mentioned."

Igniting and Extinguishing Gas-Burners.—Lentschat, G., of Cologne. No. 7299; March 25, 1898.

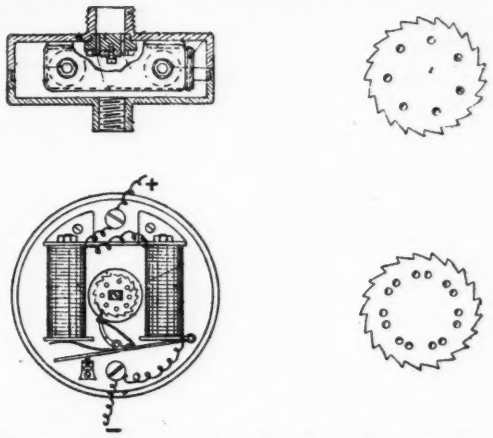
This invention relates to the controlling of the supply of gas to burners from a distance, in which the supply is closed by a rotary slide, which is at the same time formed as a ratchet-wheel, and is actuated by a pawl carried by the reciprocating armature of an electro-magnet in such manner that, by the closing of a contact on an electric circuit, the slide is turned through a certain angle, and is thereby made either to open or close a gas-channel leading to the burner. The present improvement (which is allied to No. 7298 noticed to-day) relates to a special construction of the electro-magnet armature, whereby the certainty of the action of the appliance is increased, as also its construction considerably simplified, and the expenditure of electric current lessened.

Increasing the Pressure of Air or Gas Supply.—Lecomte, A., and Loeser, I., of Paris. No. 21,281; Oct. 10, 1898.

The object of the present invention—referred to in the course of the article descriptive of the Lecomte-Loeser burner, given in the "JOURNAL" for the 27th ult., p. 1472—is to provide apparatus utilizing the direct power of water to increase the pressure of illuminating gas above that at which it is distributed in the pipes of the town, or again for sucking in and driving or forcing back under slight pressure any description of fluid—such, for example, as air. The apparatus possesses a certain resemblance to water-injectors; but instead of operating by drawing (or impulse) as is the case in those appliances, the exhauster "operates for the compression of the gas by the creation of a regular homogeneous or solid liquid piston, which is renewed without interruption, and which forces the fluid to be compressed into a divergent or extension which forms the pump-body."

Igniting and Extinguishing Gas-Burners.—Lentschat, G., of Cologne. No. 7298; March 25, 1898.

This invention relates to an appliance attached to gas-burners for admitting and cutting off the gas supply from a distance by means of a rotatable slide, the periphery of which is formed with ratchet teeth. Then there is a series of holes pierced through the slide which, on turning it by a step-by-step ratchet motion, are alternately brought to a position over the gas-supply passages so as to admit gas to the burner, where it is ignited by a permanent igniting jet, and to an intermediate position between such passages, so that the supply is cut off. The invention relates to a construction of the rotary slides in the way shown, whereby they are provided with different numbers of holes so that, of a group of burners, some will be ignited by the rotation of the slides, while others will not be ignited. The illustration shows a vertical section of the appliance and a plan with the top of the casing removed; also plans of the rotary slides with different arrangements for holes.

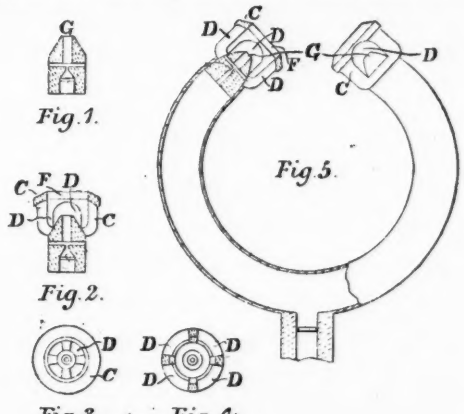


For street-lamps or for the lighting of large localities where it might be desirable that all lamps should be simultaneously lit, but extinguished consecutively in two groups, the slides of all the igniting appliances of the first group would have only one hole for every three teeth (as in the top right-hand figure); so that a hole is brought over a channel only at every third closing of the circuit for the gas to pass to the burner. The slides of the appliances on the second group would have two holes for every three teeth; so that after two igniting positions of the slide, there follows an extinguishing position (as in the lower right-hand plan). If it were required to extinguish more than two groups of lamps successively, the number of holes in the slides would need to be increased for each successive group.

In order to effect the successive group-wise ignition and the simultaneous extinction of the lamps, the rotary slides are arranged in the reverse position to that above described—that is to say, the group that is to be first ignited has the rotary slides with the greatest number of holes, and the last group those with the smallest number.

Burners for Acetylene Gas.—Bray, G. & J. W., of Leeds. No. 22,054; Oct. 20, 1898.

In this type of burner, there are separate orifices for each jet of gas, and air-inlets in the form of slits or circular or other shaped holes, so that there passes with the gas to the point of ignition, a more or less quantity of atmospheric air, after the manner of an ordinary bunsen burner.



In fig. 1, an ordinary form of single-jet air-burner is shown, as at present made for acetylene gas, with its lower central hole through which the gas passes, and side passages through which the air is drawn by the current of gas passing through the central hole. In such a burner the liability to deposit carbon is greatest when the gas is turned down to a very low pressure at the point of ignition, yielding a small flame. To obviate this, the patentees propose to add to such an air-burner an open super-

structure C (fig. 2) placed above the burner, and surrounding the jet of flame produced by it—as it were, two stories. The form which answers best has openings formed from the exterior to the interior of the superstructure at D. Fig. 3 is a plan of the open superstructure; and fig. 4, a sectional plan. The orifice F in the open superstructure through which the jet of flame passes from the air-burner, should be large enough not to disconnect at any pressure the jet of flame from the air-burner, and not too large to prevent it from acting upon the jet of flame, so as to prevent the injurious deposit or retention of carbon.

When in use, the burner conveys the gas and air to the point where they are ignited, and form the flame at the point G; and the open superstructure C deals with the flame so produced, and prevents the deposit of carbon on the air-burner below, particularly when the gas is turned down. If, however, as may happen while the flame is low, there is any material deposit of carbon on the open superstructure, it disappears when the gas is turned up to its ordinary pressure for lighting purposes.

To produce a flat-flame burner, two or more separate jets of flame are used in the ordinary manner (as illustrated by fig. 5); and they are caused to impinge upon each other to form one flat flame, similar in shape to that produced by the ordinary union-jet burner.

Automatically Lighting Incandescent Gas-Burners.—Bernstein, M., of Berlin. No. 22,783; Oct. 29, 1898.

This invention, which relates to mantles not impregnated with a platinum salt, consists in an arrangement of preferably two balls or pieces containing iridium or platinum black, or a mixture of them, on the outer surface of the mantle, in such manner that they rest loosely against it, and are each secured to a wire—the wires being twisted together above the mantle and the joint covered with asbestos. One of the wires is made of pure platinum, and the other of platinum with a coating of one of the earth-metals or a metal of the alkaline earths. When in use, the balls on the outside of the mantle soon become incandescent, and cause the wires connected to them to also become incandescent, so that the ignition of the air and gas mixture takes place at the top of the mantle. The wires, which at first lie a slight distance away from the sides of the mantle, gradually come close to it; and in this way, after the device has been used for some time, an additional advantage is said to be attained—that, whereas the coated platinum wire remains unaffected, the pure platinum wire gradually produces a deposit of metallic platinum on the corresponding side of the mantle, and so further assists the lighting of the gas.

Self-Igniting Incandescent Gas-Mantles.—Breese, R, and Perlich, A., of Dresden. No. 23,369; Nov. 7, 1898.

This invention of "improvements in gas-burners with self-igniting Auer filaments or incandescent mantles," relates more especially to means whereby the self-igniting top of the mantle is provided with a jet of a mixture of gas and air of just the right proportion to insure its working. The patentees point to the well-known fact that the initial glowing of the self-igniting top of an incandescent mantle is brought about by the mixture of gas and air impinging upon it; and to insure the initial glowing, the inflammable mixture must consist of an absolutely unvariable proportion of gas and air, which is rarely attained in an ordinary burner. To set up the initial glowing of a surety, they conduct a small quantity of gas, by means of a narrow tube, to the self-igniting top of the incandescent mantle, where it leaves the tube in the form of a number of very fine jets—several fine holes being provided at the extremity of the pipe. As these gas-jets are projected out of the tube, "the outer air mixes with them, and jets of inflammable mixture of various compositions will result, one or more of which will just contain the indicated proportions to set the top of the mantle aglowing;" and then the main jet of inflammable mixture ascending from the burner-head proper, coming in contact with the glowing top, will be ignited, and heat the whole mantle to a white glow.

Gas-Engines.—Astresse, P., of Neuilly, France. No. 23,559; Nov. 8, 1898.

This invention relates more particularly to horizontal gas-engines; and the improvements consist substantially in the arrangement of the cylinders, which are out of alignment, instead of being in a line with each other, as is the case in some existing two-cylinder motors. The patentee, however, still retains the principle of an explosion chamber common to both cylinders, the pistons of which transmit their motion to the crank of the power-shaft supported by a rigid bridge-piece—thus enabling the free circulation of air around the parts to facilitate cooling. The motion is transmitted by two connecting-rods and two beams, supported in bearings forming part of the framing of the motor.

APPLICATIONS FOR LETTERS PATENT.

5.—Barton, J. H., "Apparatus for causing gas entering it at a low pressure to be emitted at an increased pressure." Jan. 2.
42.—Forbes, E., "Automatic gas-check." Jan. 2.
63.—Boult, A. J., "Incandescence mantles, filaments, and the like." A communication from A. M. Plaissetty. Jan. 2.
104.—Spencer, J., "Improvements in the manufacture of gas and lime." Jan. 3.
109.—Readman, J., "Measuring and registering instruments with a coin-freed release." Jan. 3.
141.—Guerrier-Morel, M. L., "Generating acetylene gas." Jan. 3.
143.—Prestidge, F., "Acetylene lamps." Jan. 3.
148.—Lamport, H. R., "Apparatus for delivering measured quantities of liquids." Jan. 3.
157.—Cordes, E. L., and Daniel, P. G. E., "Water-meter." Jan. 4.
203.—Smith, F. H., "Making acetylene." Jan. 4.
204.—Smith, F. H., "Burners for acetylene." Jan. 4.
205.—Smith, F. H., "Acetylene lamps." Jan. 4.
210.—Holman, S., "Securing the lids of gas-retorts." Jan. 4.
253.—Dolan, E. J., "Gas-burners." Jan. 5.
273.—M'Intyre, J., "Separating moisture in reheaters for compressed air carburetters, and the like." Jan. 5.
281.—Lanchester, F. W., "Igniting gas and oil engines." Jan. 5.
290.—Georis, E. N. D., "Carburetters." Jan. 5.
331.—Tourtel, J., "Seal-locks." Jan. 6.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Carburation of Coal Gas.

Sir,—I was led to begin this correspondence by a desire to clear up a haziness which seemed to exist in regard to the manner in which the process in operation at Hastings prevented naphthalene being deposited in the troublesome solid form, and to show that Mr. Botley's theory of the creation of an artificial vapour tension was inconsistent with all recognized laws bearing upon the subject, but that the results obtained were quite consistent with those produced by kindred processes employed for similar purposes, and were quite explainable upon well-known laws and principles—that in reality the process was an oil-scrubbing process carried out in the mains and services.

Mr. Botley, in his letter in your last week's issue, practically admits that his artificial vapour tension theory was advanced upon no tangible basis, upon no known law or kindred process, but, as it were, giving a name to some unknown cause which accomplished the effect. While, however, Mr. Botley thus abandons his theory, he does not seem disposed to admit that his process is what I characterized it—an oil-scrubbing process carried out in the mains and services—for he says, in referring to the amount of oil recovered from the drip-wells, that I confuse matters by not recognizing the distinction he makes between the oil precipitated in and adjacent to the works, and that found in the street syphons.

Now, as far as the scrubbing theory is concerned, it matters nothing where the oil is deposited. Provided it is deposited, it will carry with it the naphthalene in solution; and the very nature of the process necessitates that the major part of the scrubbing oil will be precipitated in or near to the works—only the very-finely divided portion travelling to greater distances. But there is no doubt that the naphthalene is dissolved or scrubbed out of the gas both by the less perfectly sprayed portion which is precipitated and that carried forward to the burners in a fine state of division, which, in my opinion, would be exceedingly small.

Mr. Botley's admission that, when carburetted water gas is made of a semi-permanent character, it will partially accomplish similar results to his carburation process, is directly at variance with his theory of the creation of an artificial vapour tension, and supports the view that the process is dependent on the solvent power of the finely-divided liquid oils, and that in both cases the naphthalene is simply prevented from being deposited in the solid form by being dissolved. I have no doubt that both carburetted water gas and Mr. Botley's process will prevent naphthalene being deposited in the solid form; and I have from the first freely admitted that Mr. Botley's process will have this effect unassisted by the carburetted water gas. My object in alluding to carburetted water gas was to show that the result obtained by both processes was due identically to the same cause. Mr. Botley is in error in supposing that carburetted water gas cannot be made profitably so as to get a high candle-power value per unit of oil used. The highest enrichment value—the purpose for which carburetted water gas is mostly used—is invariably obtained when the oils are decomposed, or so far cracked up as to leave a portion of them suitable solvents for naphthalene, which would be carried forward in the current of water gas; and just in proportion as the oils used are further cracked up so as to produce naphthalene, or show it in the carburetted water gas, the lower will be the candle-power value per unit of oil used.

I have all along freely admitted that Mr. Botley's process may afford him immunity from naphthalene troubles; and I have never questioned that the means employed are in harmony with well-known physical laws. What I have doubted is not the result, but Mr. Botley's theory of how these results are brought about; and I have tried to show that they are exactly what might be expected, both from the known laws of science and from a kindred process substantially identical to that in use at the present time at Hastings.

Like Mr. Botley, I think this matter is now pretty well thrashed out between us, in a friendly manner, like people in search for the truth. I regret that in my last letter I, inadvertently, made use of the word fiction, when the word error would have better conveyed my meaning; and I am sure if the latter word is applicable to anything he has said, it was "unconsciously" said by him. Far be it from me to grudge Mr. Botley the happiness of enjoying the "beneficent effects" of his process, with or without theory; but the true theory often leads to further discoveries, while the false leads only to a chase after a "Will o' the wisp." If the discussion has helped us towards the true theory, it has not been carried on in vain.

Priorsford, Peebles, Jan. 12, 1899. Wm. Young.

Contamination of Gas in Holders.

Sir,—In your last issue there is a short article on the above subject. I am in charge of a small works, where we have very adequate condensing, scrubbing, and purifying plant, but no washer. We do not make any pretence at purification from sulphur compounds other than sulphuretted hydrogen, excepting in so far as these are removed in the strong liquor scrubber and the foul oxide purifier. I have been more than once alarmed, and perplexed at the reason, in finding traces of sulphuretted hydrogen at the outlet of one of my two holders—especially, although at the time the gas has been perfectly clean at the bottom layer of the last purifier. I know of at least one more works similarly affected; and if the apparent mystery can be satisfactorily explained, and a remedy suggested by anyone who has been similarly troubled, he will earn the gratitude of at least two of your constant readers.

I may say that a continuous stream of clean water is kept running into my holder tanks; the overflow consisting of a 2-inch wrought-iron pipe which descends to within 1 foot of the bottom of the tanks. The sulphuretted hydrogen shows itself in the hottest part of the summer months, disappearing altogether in the winter; so that the question of temperature seems to be an active factor. I have never been able to get any trace of sulphuretted hydrogen by boiling a sample of water taken from bottom of the tank, and receiving the steam into a solution of lead acetate; and I have added to the water in the tank a quantity of lead acetate with a view to precipitation, but apparently have obtained no

relief in this way. All my pipes up to the outlet of the station-meter are above ground—so that no stray connection has gone awry; and the holder tanks are not in the vicinity of tar and liquor wells from which contamination might arise.

Jan. 14, 1899. "DÉSAGRÉMENT."

PARLIAMENTARY INTELLIGENCE.

PRIVATE BILLS (SESSION 1899).

Opposition on Standing Orders.

Monday last week was the final day for depositing, at the Private Bill Office of the House of Commons, memorials complaining of non-compliance with Standing Orders in the case of the first hundred Bills in the General List of Petitions. On that day memorials had been received in regard to the petitions for the Skipton Gas Bill, the London Water (Welsh Reservoirs and Works) Bill, the Newhaven and Seaford Water Board (Transfer, &c.) Bill, and the Barking Town Improvement Bill; the memorialists being the Skipton Urban District Council, Stephen Thomas and others, the Newhaven and Seaford Water Company and others, and Elias Keys and others. Although the second memorial has been deposited simply in the name of "Stephen Thomas and others," it bears the signatures of more than a hundred persons who are interested in the property proposed to be taken for the Yrfon and Wye Valley reservoirs of the London County Council. These persons consist of landowners, lessees, and occupiers, who complain that they have not received any notice of the proposed scheme, though the Council have in contemplation the acquisition of their property under the powers of the Bill. There are further allegations in respect of misdescriptions of property, erroneous notification as to public and private roads, and also with regard to parish boundaries; with the result that in some cases books of reference for certain properties have been deposited in the wrong parishes. The memorial is between 30 and 40 yards in length; and it is anticipated that the contest before the Examiners, who will commence sitting to-morrow, will last upwards of a fortnight, and will necessitate the bringing up of a considerable number of witnesses from Wales. This is the result of an examination of plans and books of reference by the expert staff engaged by the London Water Companies, who are desirous of challenging the County Council's new Welsh water scheme at its very initial stage. The petition for the Bill will be one of the first to be considered. The memorial of the Urban District Council of Skipton sets forth that the Company are seeking powers of which no mention was made in the notice given for the Bill. These, it is alleged, comprise the proposal to change the maximum dividends which the Company now have the right to pay into dividends regulated by a sliding scale. The proposal to form an insurance fund to the extent of one-twentieth of the paid-up capital of the Company is also alleged to have been omitted from the notice, as well as the power sought to pay 4 per cent. interest on money deposited by consumers. The proposed powers with reference to charges for gas registered erroneously are also alleged to be outside the notice. On these grounds, the Council ask to be heard against the Bill on Standing Orders.

The following Bills, the petitions for which are among the first hundred, will not be opposed upon Standing Orders: Arbroath Corporation Gas Bill, Ayr Burgh Bill, Belfast Water Bill, Blackpool Improvement Bill, Burley-in-Wharfedale Urban District Water Bill, Bury Corporation Water Bill, Cambridge Gas Bill, Darwen Corporation Bill, Dublin Corporation Bill, Dundee Gas, &c., Bill, Fishguard Water and Gas Bill, Glasgow Corporation (Gas and Water) Bill, Great Yarmouth Water Bill, London Water (Purchase of Companies) Bill, Loughborough Corporation Bill, Lowestoft Water and Gas Bill, Manchester Corporation (General Powers) Bill, New Mills Urban District Council (Water) Bill, Redditch Gas Bill, Rushden and Higham Ferrers District Gas Bill, St. Neot's Water Bill, Salford Corporation Bill, Sheffield Corporation (Derwent Valley) Water Bill, South Essex Water-Works Bill, Stockport Corporation Water Bill, Stockport District Water Bill, Stockton and Middlesbrough Water Bill, Totland Water-Works Bill, Warrington Corporation Bill, West Gloucestershire Water Bill, West Middlesex Water Bill, Whitehaven Corporation Bill, Wolverhampton Corporation Bill, Workington Corporation Water Bill.

Improved Public Lighting at Bromley.—The Bromley Gas Company have agreed with the District Council to provide 47 new lamps with lanterns, burners, and mantles, at £4 10s. 6d. per lamp per annum; the contract being for one year, determinable thereafter by six months' notice in writing. Inasmuch, however, as the provision of new lanterns and burners will involve a considerable outlay on the part of the Company, they stipulate that if the right to terminate the agreement is exercised at the end of the first year, an additional sum of £200, of the second year £150, of the third year £100, or of the fourth year £50, should be paid as compensation. The existing lamps are also to be fitted with incandescent mantles.

The Pressure of Gas at Newcastle-on-Tyne.—With reference to the complaints regarding the pressure of gas at Newcastle (alluded to in a paragraph in the "JOURNAL" for the 3rd inst.), Mr. Riley Lord gave a short account of what had transpired in regard to the subject at the meeting of the City Council last Wednesday. He regretted that the legal powers of the Corporation were insufficient to meet the matter, and stated that the Gas Committee had passed the following resolution which, it was hoped, would meet the difficulty: "That the Gas Company be asked to agree to the placing, by the Corporation, in twelve different parts of the city, of places of access to the Company's mains, for the purpose of enabling the Corporation to ascertain and test the pressure of gas, and that the Company be asked to supply the Committee with a map showing the main pipes of the Company." He trusted that they would now be able to "lay hold" of the Company if in future they came below the legal standard. In the course of the proceedings, the Town Clerk read a letter in which the Secretary of the Company regretted that, owing to no fault of the Directors, new works which had been promised last year had not been completed. These works were mentioned in detail; and an estimate was given as to the time when they were likely to be finished.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Thursday, Jan. 12.

(*Before Mr. Justice* KENNEDY, *without a Jury.*)

Incandescent Gas-Light Company and Others v. Brogden.

In this case the plaintiffs claimed an injunction restraining infringement of their patents.

Mr. T. TERRELL, Q.C., Mr. A. J. WALTER, and Mr. J H. GRAY appeared for the plaintiffs; Mr. LAYMAN and Mr. G. ELLIOTT for the defendant, Mr. George Brogden, of South Shields.

Mr. TERRELL, in opening, explained that the plaintiffs claimed an injunction against the defendant to restrain him from infringing two letters patent—No. 15,286 of 1885 and No. 3592 of 1886. There were two classes of infringement alleged. One was the direct infringement by manufacturing mantles—he was assuming his Lordship knew the subject matter of the litigation—which were an infringement of the two patents. The other class of infringement was by selling mantles supplied by the plaintiffs in breach of the conditions on which they were sold, and which conditions, if broken, made the use or sale of the mantles an infringement of the patent. He would explain. When a patentee sold a patented article without conditions, he sold it with a licence to use the article in any way the purchaser chose. But a patentee might sell a mantle or other patented article with an express contract limiting that licence; and if so, the use of the patented article in the way stipulated against by the patentee in his contract, was an infringement of the patent. This was well settled law; and in this particular instance the contract had been held valid by Mr. Justice Wills. Plaintiffs were patentees and manufacturers of mantles for the giving of light; and for the purpose of incandescence, it was absolutely necessary to have a bunsen burner—a burner which did not burn the gas in its natural state, but burnt it mixed with a certain amount of air, so as to give a flameless light. It was important for the plaintiffs' patent that the burner used should be an accurate one; and for this and other reasons they made a special contract which was printed and fixed to the mantle-boxes, and sold with each box. If a purchaser bought a mantle without notice of the conditions, he was not bound by it; but if he had it brought to his attention, then he was bound. In this particular case, the defendant had had a long dispute with the Company before the date of the purchases which were the cause of action; and his contention was that the contract was void and bad. He said he had taken the legal opinion of several magistrates and solicitors on the matter, and he had been advised that it was bad. That was all in the correspondence; and therefore there was no doubt that at the time of the purchase of the infringing mantles, he had notice of the contract. Another important circumstance was that defendant had sold some of the plaintiffs' mantles in connection with burners he obtained elsewhere, which were not the plaintiffs'; and he pasted over the boxes a piece of paper, so as to hide the notices printed on them. This was one cause of action; and the validity of the conditions had never been disputed since the decision of Mr. Justice Wills. The other part of the action was for selling mantles manufactured in infringement of the plaintiffs' patent; and injunctions to the number of some 300 or 400 had already been granted since 1893, when Dr. von Welsbach, the inventor of the patents, discovered a great improvement in them. This discovery converted what was a very interesting toy into an important article of commerce; and most of the infringements of the last few years had been infringements of the 1893 invention.

Mr. LAYMAN (interposing) said he did not dispute all this, as he did not in any way set up a claim to manufacture mantles like those of the plaintiffs. His case, on the pleadings, was that he never sold or made them; and it was for the plaintiffs to prove that he did so.

Mr. TERRELL said then he proposed to prove that in December, 1897, three mantles were ordered from the defendant by Mr. Moore, the agent of the plaintiffs, for the purpose of ascertaining infringements; and they were sent through a person named Smith. The plaintiffs alleged that Smith and the defendant were one and the same. This was the direct infringement alleged, because the mantles supplied were not of the plaintiffs' manufacture. Though it was only one instance, he had only to prove a single infringement to get his injunction; but, as a matter of fact, the defendant had been guilty of wholesale infringement. Again, in December, 1897, Mr. Moore bought a mantle which was sold to him with another burner, not of the plaintiffs' manufacture; and the label was pasted over with paper.

Mr. *W. J. Moore*, a gas engineer employed by the plaintiffs, and Mr. *Wm. Burnett*, an inquiry agent also employed by plaintiffs, gave evidence as to making purchases of infringing mantles.

Mr. *G. A. Gutch*, the Secretary of the Company, proved that he had correspondence with the defendant on the subject of the conditions printed on the labels.

Mr. *George Brogden*, the defendant, admitted he had been receiving orders for infringing mantles, and passing them on to Smith and Co., who supplied them. He had an arrangement with Smith whereby he was to receive 5 per cent. commission on all orders he procured; but this was not in force now, and he had no connection with Smith. He believed his wife sometimes stored goods for Smith; and he suspected they were mantles. Witness was advised by legal authorities that the plaintiffs' conditions printed on the mantle-boxes were not binding on him if he did not sign any contract.

Mr. LAYMAN, for the defence, then submitted that even if defendant knew of the conditions on which the Company sold their mantles—namely, that they were only to be used with their burners—yet if he did not buy the mantles from the Company but from a dealer, he could not be said to have a contract or agreement with the Company, although the dealer who bought from the Company might have entered into such an agreement. He submitted there was nothing in the Patent Act which authorized the plaintiffs' to impose such conditions on the purchaser; otherwise they might search peoples houses to see how the burners were being used.

His Lordship asked if it was not sufficient that the notice should be on the box.

Mr. Layman submitted that it was not, if there was no contract.

Mr. Terrell said it had been decided, and was settled law, that the notice on the box of the conditions required was sufficient. If a man had a patented article, he could impose any condition in regard to its sale and use, however absurd it might be; and if the purchaser bought the article with notice of the condition, he was bound by it.

His Lordship said in this case he thought the defendant had taken the wrong view of the law. No doubt he might think he had been hardly treated; but at some time or another he had done something for which he had been enjoined before. The first thing charged against him now was the selling of mantles, with a partner, of another Company. He said he was not bound by the restrictions which existed on the box containing the mantle, which he subsequently sent to another person's partner. He said he thought he was not bound by law on that. He (Mr. Justice Kennedy) thought he was wrong there. A patentee certainly had a right not merely to give a licence without reserve to a purchaser to use his patent, but he also might attach to the licence any conditions; and if those conditions were broken, there was no licence. This gentleman certainly did deal with it in a way inconsistent with these conditions. The facts were not disputed as to this; and the question was how were they to be dealt with. The defendant insisted on it as a right; but that right did not exist, and there must be an injunction and such consequent inquiry as was found to be necessary. The second point was as to the sales through Smith. There was a great deal of suspicion as to whether there really was a Smith; but assuming that there was, this person used the shop of the defendant's wife as a store-house for mantles. The business was carried on by that gentleman in such a way that it was quite clear he was supplying infringing mantles. Defendant did supply (through Smith) these infringing articles, and in the course of business, for he had 5 per cent. commission on the orders, and had himself received money for the articles. Defendant was in a position to deliver mantles through Smith, to receive money for them, and to take part of the profit. If this was the course of business—as the infringing character of the mantles was not in dispute—it constituted infringement. The defendant evidently thought that one injunction having been secured against him, he could procure orders for another to execute, and that this would not be a breach of the law. He was wrong about that also. The injunction asked for would be granted with costs, and an order made for inquiry and for delivery up of the infringing articles.

Stealing from a Penny-in-the-Slot Meter.

At the Bolton Quarter Sessions last Thursday, a labourer named Robert Schofield pleaded guilty to having abstracted from a penny-in-the-slot-gas-meter the sum of 7d., the property of the Corporation. It appeared that on Christmas Day the prisoner broke into the house of one James Connolly, and removed the contents of the meter. The Recorder (Mr. S. Pope, Q.C.), in passing sentence, said the Corporation property must be protected from such thefts. Prisoner was a cunning fellow, and would have to serve two months in gaol, with hard labour.

Polluting the River Wey.

The Guildford Corporation were summoned at the Borough Police Court on Monday last week by the Thames Conservancy, for causing a pollution of the River Wey, by the discharge of sewage into a ditch leading thereto on the 6th ult. Mr. Bunting prosecuted; Mr. F. F. Smallpeice, the Town Clerk, defended. The evidence for the Conservators showed that a sewage syphon was emptied by the Corporation employees upon a meadow which sloped towards the ditch, and proper precautions were not taken to prevent the escape of the sewage. The result of the analyses of three samples taken by the Conservancy Inspector was that they contained 10 parts per million of albuminoid ammonia, and all of them were pronounced by Professor Groves to be bad samples. Mr. Smallpeice submitted that the Town Council had no intention of causing the pollution of the river, and thought their officers would take proper precautionary measures. The Bench imposed a fine of £5.

The Alleged Defalcations by a Gas-Works Clerk at Stafford.

At the Stafford Borough Police Court last Tuesday, charges of larceny were preferred against Albert William Neighbour, formerly cashier at the Corporation gas-works. In the previous week, he was committed to the Quarter Sessions to take his trial on charges of falsification of books. Mr. B. C. Brough and Mr. P. Burke defended. The first charge related to the sum of £133 13s. 3d., alleged to have been misappropriated on divers days between May 12, 1896, and March 31, 1897; the second to a sum of £243 1s. 2d., alleged to have been misappropriated between April 1, 1897, and March 31, 1898; and the third to a sum of £289 0s. 5d., alleged to have been misappropriated between April 1, 1898, and Dec. 14, 1898—the day the prisoner was suspended. Mr. J. F. Bell, the Manager of the gas-works, deposed that prisoner, as cashier, was the recipient of all moneys which went into the department; and it was his duty to pay the whole of the moneys into the bank, with the exception of the petty cash payments which were made on his (witness's) authority. Mr. Attlee, chartered accountant, gave evidence similar to that tendered at the former hearing, showing that the sums named had not been accounted for by the prisoner. Neighbour was committed to take his trial at the ensuing Quarter Sessions; bail being allowed.

Discharging Tar into the Public Sewers.

At the West Ham Police Court, on Monday last week, Messrs. Burt, Boulton, and Haywood were fined in two sums of £5 and £1, with costs amounting to £84 7s., for allowing tarry matter to find its way into the sewers, in contravention of the provisions of the Public Health Act, 1890. Considerable damage was done to a sewer last summer in consequence of an explosion caused by the presence of this matter.

MISCELLANEOUS NEWS.

THE GAS UNDERTAKING OF THE SOUTHPORT CORPORATION.

Mr. Corbet Woodall's Report.

It will doubtless be remembered that early last September the Southport Town Council decided, on the recommendation of the Gas Committee, to ask Mr. Corbet Woodall to investigate the working of the gas undertaking, and report upon any improvements which would be likely to result in making it more profitable. The circumstances which gave rise to the recommendation were fully set forth in the last volume of the "Journal" (pp. 162, 388, 648), and need not be repeated. Suffice it to say that the member of the Council who initiated the subject (Dr. Weaver) expressed his satisfaction with the appointment. Mr. Woodall visited the works early in October, and received from the Engineer and Manager (Mr. John Booth) such facilities and information as were required. He also had an interview with the Borough Accountant, and subsequently obtained from him and Mr. Booth explanations of certain matters in the accounts. No definite directions were given to Mr. Woodall as to the points on which his opinion had been sought. He therefore assumed them to be: (1) Are the works in good order and the apparatus of a character to secure economical results? (2) Is the profit earned as large as it should be, regard being had to the price charged for gas? The report was made on the 21st ult., and was considered by the Gas Committee last Tuesday, and ordered to be circulated among the members of the Council. The following is an abstract of the document.

Dealing first with the condition of the works, Mr. Woodall says they are well arranged and kept in excellent order and repair. The retort-houses, however, are low and somewhat cramped; and the retorts, which are brick-built with tile floor, are set in beds of six, with furnaces which, while maintaining excellent heat, are not so economical as more modern ones on the regenerator system would be. Mr. Woodall admits that the advantage claimed for this kind of retort is that it has a longer life than the clay retort generally in use. Brick retorts can be repaired with facility, and kept going for a long time; and if their efficiency remained constant, and the repairs involved small cost, the long life would be a strong argument to set against some disadvantages. The cost of repairs for retorts only has been separated from the aggregate repairs, and it appears to be equal to 1d. per 1000 cubic feet of gas sold. This is perhaps slightly less than the expenditure when clay retorts are used; but the difference is hardly appreciable. On the other hand, the larger quantity of fuel needed in the furnaces involves a loss more than equal to the possible saving in repairs. On the whole, Mr. Woodall is of opinion that advantage will result from adopting clay retorts in place of those now used.

Turning from this detail to the larger question of the retort-house as a whole, Mr. Woodall thinks that when the present settings are sufficiently worn to need serious repairs or renewals, it will be advantageous to rebuild them on a more economical system. The fuel used may, he says, be very considerably reduced, and a saving of some 40 per cent. effected in wages; while the labour will be less trying to the men. This can be done by setting a larger number of retorts to each fire, and by adopting either the inclined system of setting or mechanical stoking. Though there has been erected at the works one of the best-designed plants for the production of carburetted water gas Mr. Woodall has yet seen, he was surprised to find that it was scarcely employed at all, though by its use gas of superior quality to that distributed could be made at less cost. He was unable to ascertain the reason for this. Assuming oil could be bought at 3½d. per gallon in Southport, carburetted water gas of 20-candle power could be made ready for delivery at a cost of 14½d. per 1000 feet. The corresponding charge for coal gas has averaged during the past three years 17¾d., or a difference of 3¼d. As 1d. per 1000 feet amounts to £1500 per annum, it is obvious that a great improvement in the profit balance may be effected by the free employment of the apparatus with which the Committee have equipped the works at considerable cost.

Mr. Woodall points out that while the average cost of gas making, according to the accounts, has been 17¾d. per 1000 cubic feet in the past three years, this includes an unusual amount for repairs and maintenance, Putting together the charges for repairs and maintenance of works and mains and services, the total for 1898 is 6¼d. per 1000 cubic feet. This, he says, is considerably more than the average expenditure on these items in such works as those at Southport. There are times when a still larger amount is necessary—as, for instance, will arise when the retort-houses are reconstructed. During the years in question there have been no such items of special reconstruction; and the only explanation remaining is that charges which in ordinary practice would fall upon capital have been debited to revenue. He points out instances of this having been done; but he does not mention them with the object of criticizing them adversely. On the contrary, he thinks the Committee well advised in striving, so far as they legitimately can, to keep down the capital account. He simply wishes to show that the balance of profit cannot be so large as it otherwise would if these claims are made against it.

On the question of profits, Mr. Woodall found some difficulty in comparing the working and profits of successive years because of the method in which the accounts are kept; and he strongly advises the Committee to adopt, as nearly as may be, the form contained in the schedule to the Gas-Works Clauses Act, 1871. The plan of including stocks in the revenue account is characterized as specially undesirable; as it introduces an unnecessarily perplexing complication. Such stocks need only appear in the balance-sheet. The balance of profits shown during the past six years, after correcting for stocks, has been as follows:—

Year.	Gross Profit.	Interest and Sinking Fund.	Actual Net Profit Balance.	Net Profit Balance Shown in Accounts.
1893	—	£6451	—	£4,456
1894	£10,730	6491	£4,239	7,111
1895	23,255	6861	16,394	16,257
1896	14,220	7164	7,056	10,099
1897	14,201	7351	6,850	9,039
1898	13,158	8438	4,720	6,716

Mr. Woodall points out that the variations are considerable, and call for explanation. He acknowledges that the year 1894 was a very unfavourable one for gas undertakings, as there was a serious strike among the colliers; and the loss on this account in Southport was £1867. The

following year was also an exceptional one, but in the opposite direction; the profits being the highest recorded. The reasons given by Mr. Booth for the large balance were the substitution of oil for cannel as an enricher, an increase in the price of gas, cheaper coal, and less expenditure for renewals. Mr. Woodall thinks full consideration should be given to these causes, because it is palpable that disappointment must ensue if a year of exceptional and accidental prosperity is established as a standard. He regards it as unfortunate that the wording of the Manager's report (which, it may be remembered, led to the request for an inquiry) should appear to ascribe too much importance to the first of these reasons. Mr. Booth pointed out that the enriching material cost £9023 less in 1894 than in 1893; but Mr. Woodall thinks he failed to take into account the bulk of gas he formerly made with cannel. If the cost of replacing this is allowed for, the saving is reduced to about £2400. A contrast of the salient figures of income and expenditure from the accounts of 1895 and 1898 will best explain the apparent falling off in profit:—

	1895. Per 1000 Cub. Ft.		1898. Per 1000 Cub. Ft.
	s. d. s. d. s. d.		s. d. s. d. s. d.
Price of gas	3 3 3 9 4 0	..	3 0 3 6 4 0
	d.		d.
Receipts for gas	36·20	..	32·60
Receipts for meter and stove rents	0·87	..	nil.
Interest and sinking fund	4·92	..	5·63
Cost of coal	15·19	..	14·00
Value of products	8·23	..	6·00
Net cost of coal	6·96	..	8·00
Repairs and renewals (on works)	5·30	..	6·30

By taking the profit made in 1898, and correcting it by the differences, it will be seen whether the working of the undertaking is less successful than it was in 1895.

Profit earned		£13,158
Add meters		2,542
Gross profit		£15,700
Heavier net cost of coal, &c.	£2,193	
Higher expenditure on repairs and renewals	1,390	
Heavier cost of lighting and repairing public lamps	500	
Lower price of gas	5,400	
Value of meter and stove rents abolished	1,214	
Heavier cost of interest and sinking fund	1,577	
	£12,274	
Correction for increased sales of gas: $\frac{338}{360} \times$ £12,274 =		11,524
		£27,224

As against £23,112 in 1895.

The manufacturing results thus compare very closely with the record year of the undertaking in 1895. Mr. Woodall remarks that the question of charging meters in 1898 all to capital, instead of to revenue as before, has complicated these figures a little, and he has kept the £2542 a separate item, to show that it is brought into the account. From the consumers' point of view, there has been a remission of charges since 1895 equal to £6600 per annum. He expresses the opinion, judging from the accounts modified in the direction indicated, that, if the Committee desire to administer the gas undertaking in the interest of the consumers only, they can supply gas of 20-candle power at a price of (say) 2s. 3d. per 1000 cubic feet, made up as follows: Net cost of materials and purifying, 8·10d.; wages and salaries at works, 4·50d.; repairs of works, 3d.; rates and taxes, 0·84d.; distribution, 3·49d.; management, 1·03d.; interest and sinking fund, 5·63d.—total, 26·59d. He thinks this cannot be regarded as showing unsuccessful management.

In conclusion, Mr. Woodall tells the Committee that they are in possession of works which are, in size, generally well in advance of present requirements. The exception is in storage, which is slightly deficient. He says the works are well designed and well kept, and are a credit to the town. He advises that the Committee should cause steps to be taken in preparation for the reconstruction of the retort-house and bench, though the work may not be put in hand till the latter is in need of heavy repairs; also that the accounts should be kept in the form to which he has referred. He recommends that the Committee should, in future, be advised yearly as to the special expenditure which has been charged against revenue; and, finally, that a much more liberal use should be made of the carburetted water-gas plant.

SHEFFIELD AND THE GAS COMPANY'S UNDERTAKING.

In an article on "Municipal Profits," the "Sheffield Independent" advocates the extension of municipal business in the city by the purchase of the Gas Company's property. Our contemporary says: "We do not understand the spirit in which some of our correspondents protest against the lowering of the rates on the ground that they do not have to pay rates. Looked at in the least unselfish way by a man who apparently has no rates to pay—though really he pays his rates in his rent—the lowering of the rates, so long as it is consistent with good government and cheap and plentiful public services, as in the case of the trams, must be an advantage, for it leaves the greater power of expansion in the city's revenue, a power which may be taken advantage of in the future for fresh enterprises for the public good, but which could not be undertaken if the city were already spending every farthing it could afford. So far from regarding with disfavour any enterprise that will earn money to lower the rates—though that should only be a secondary object in municipal undertakings—we hold that the system of municipal business, inaugurated with the tramways and continued with the electric light development and the taking over of the markets, may very well be carried farther. Some of the shrewdest of our Sheffield councillors believe it would be well even now to set about buying out the Sheffield Gas Company." From the Board of Trade returns the writer quotes the profits made by the gas undertakings of Birmingham, Manchester, Leicester, Nottingham, and Glasgow, and winds up with the remark: "Instead of regarding these profits as a calamity, we fancy the vast majority of practical Sheffielders would look upon them as a blessing, and are anxious for the day when the example of these towns can be followed in Sheffield."

WIDNES CORPORATION GAS SUPPLY.

Improved Sulphate Working—Large Output of Gas.

At the Meeting of the Widnes Town Council last Tuesday, the minutes presented by the Gas and Water Committee contained some interesting items. The Engineer (Mr. Isaac Carr) reported that, in consequence of the increased durability of the new regenerative settings, no fresh retorts will be required this year; and the only repairs necessary will be to the furnaces, and the usual patching. He also reported that during the greater part of the current financial year the sulphate of ammonia plant had been working with his improved form of superheater,* which effected a considerable saving in the cost of manufacture. The following statement was given to show the reduction in the cost of working as compared with previous years:—

	Per Ton.		On Annual Make of 260 tons.
Saving in fuel, 25 cwt., at 7s. per ton	£0 8 9	..	£113
Do. in acid, 6½ cwt., at 25s. 6d. per ton	0 8 3	..	107
Do. in soda, 2½ cwt., at 4s. per cwt.	0 10 0	..	130
Do. in anthracene oil, 21 lbs., at 3s. per cwt.	0 0 7	..	8
Extra quantity of sulphate made per ton of coal carbonized, 2·42 lbs., which on 21,000 tons of coal is equal to 22 tons 14 cwt., at the net value—*i.e.*, £6 12s. 6d. per ton	0 11 6	..	150
Total	£1 19 1	..	£508

Mr. Carr attributed the saving in fuel, acid, and oil entirely to the superheater; while the economy in soda and the increased make, he said, were, in a great measure, though not solely, due to it. Passing to the subject of gas supply, he reported that the total number of applications received for the supply of gas on the prepayment system was 3423; and the number of houses fitted up, 3234. The quantity of gas made last month was 24,980,000 cubic feet, against 23,181,000 cubic feet in December, 1897; the gas delivered being 24,808,000 cubic feet, as compared with 22,559,000 cubic feet in the corresponding month of the previous year.

In moving the approval of the minutes, the Chairman of the Committee (Alderman Timmis) called attention to the fact that no retort renewals would be required this year, because the new furnaces introduced made the life of the retorts so much longer. This was a matter worthy of comment. The Engineer had given a great deal of attention to the manufacture of sulphate of ammonia, and had patented an arrangement the result of which was an improved form of superheater, which reduced the cost of manufacture and improved the quality and quantity of the material; and the Committee and the ratepayers would benefit by this invention. The Committee had also reached the maximum make and the maximum output of gas. They had made on the 22nd of December a million cubic feet of gas. These were figures they had hitherto not approached; and they emphasized the progress that was being made in the town. Mr. Davies seconded the motion; and it was carried.

METROPOLIS GAS SUPPLY.

Dr. A. W. Williamson's Quarterly Report.

The following is an extract from the report of Dr. A. W. Williamson, F.R.S., the Chief Gas Examiner for the Metropolis, on the quality of the gas supplied to London during the quarter ended the 31st ult.:—

I. *Illuminating Power.*—The average lighting power of the gas at all the testing-stations was higher than the parliamentary standard.

II. *Purity.*—With the exception of four occasions at the Parnell Road station of the Commercial Gas Company, the presence of sulphuretted hydrogen was not reported to have been present in the gas throughout the quarter. The average amount of sulphur was considerably less than the quantity permitted—viz., 22 grains—at all the testing-stations; and the maximum amount was within that limit. The limit allowed for ammonia—viz., 4 grains—was not exceeded on any occasion during the quarter.

Average Illuminating Power and Amount of Sulphur at the Testing-Stations.

	Illum. Power.		Sulphur.
The Gaslight and Coke Company—			
Fenchurch Street, E.C.	16·4	..	12·3
Kinghorn Street, Cloth Fair, E.C.	16·6	..	11·6
Dorset Buildings, E.C.	16·5	..	10·3
Millbank Street, S.W.	16·5	..	8·6
Ladbroke Grove, W.	16·4	..	11·5
Vincent Terrace, N.	16·4	..	13·5
Carlyle Square, Chelsea	16·2	..	11·1
Camden Street, N.W.	16·3	..	12·3
Graham Road, Dalston	16·5	..	10·8
Kingsland Road, E.	16·6	..	12·3
Spring Gardens, Charing Cross	16·3	..	11·6
Vinery Villas, St. John's Wood	16·1	..	13·3
Lambeth Road, S.E.	16·2	..	9·3
Hornsey Road, N.	16·4	..	9·8
George Street, Hampstead	16·4	..	13·7
Commercial Gas Company—			
Wellclose Square, E.	16·1	..	8·7
Parnell Road, Old Ford	16·4	..	8·0
South Metropolitan Gas Company—			
Hill Street, Peckham	16·8	..	9·4
Bedford Road, Clapham	16·4	..	10·6
Stoney Lane, Tooley Street	16·5	..	12·6
Lewisham Road, S.E.	16·4	..	11·3
Blackfriars Road, S.E.	16·5	..	11·0
Burrage Road, S.E.	16·4	..	11·2

New Water-Works for Barry.—On the recommendation of the Gas and Water Committee, the Barry District Council have decided to spend £13,000 in sinking a new well at Biglis Moors, the erection of a pumping station, and the laying of a new main.

* See "JOURNAL," Vol. LXXII., p. 1361.

ANOTHER GAS POISONING CASE IN BELFAST.

The distressing case of gas suffocation at Belfast which we reported last week was followed within a week by a second one, the circumstances of which were very similar and not less painful—a woman aged 57 years and a child four years old both losing their lives. The accident occurred on Tuesday morning at 9, Park Lodge Crescent, which house is in the occupation of Mr. John H. M'Cabe, a traveller for a firm of woollen merchants. The deceased infant was one of his children, named Minnie; while the woman was the housekeeper, and named Mary M'Anally. The little girl, who had for some time back been occupying the front attic with the housekeeper, was put to bed about eight or nine o'clock on Monday evening. Soon afterwards she was heard calling for her father; and when Mr. M'Cabe went up to the attic, the child told him she was afraid of the darkness. When he left the room she was apparently asleep; but it is supposed that the child wakened again, and finding herself alone endeavoured to light the gas by simply turning it on, afterwards going to sleep without turning it off. This, of course, is merely a matter of surmise; but it seems to supply the only plausible explanation of the occurrence. Mrs. M'Anally retired to bed later in the evening. It was her custom, as a precaution against catching cold, to close the door and window of the attic, and even to pull a cover over the grate to shut out the draught from the chimney. On Tuesday morning, Mr. M'Cabe went to the upper storey for the purpose of calling the housekeeper. Receiving no response to his summons, he opened the door of the attic, and at once became aware of a sickening smell of gas. He went over to the bed, and was horrified to discover his housekeeper quite dead; and his child in an unconscious state, though still breathing. On examining the bracket he found the gas full on. Having removed the child to another room, and turned off the gas, he summoned Dr. Tomb, who on arriving stated that, in the case of Mrs. M'Anally life had apparently been extinct for an hour and a half. He examined the child, and though he was almost certain that she was beyond restoration, he had a colleague called in, and together for over three hours they endeavoured, by artificial respiration and other means, to restore animation. But the carbonic oxide poisoning (so it is stated) had saturated the system; and the infant succumbed. The apartment in which the sad fatality took place is 11 feet by 12 feet. Unfortunately, there was no means by which the gas could escape; all the openings having evidently been closed by Mrs. M'Anally.

An inquiry into the matter was held by the City Coroner (Mr. E. S. Finnigan) on the following day. The first witness called was Catherine Doherty, the daughter of the unfortunate woman, who identified the body of her mother. She was followed by Mr. M'Cabe, whose evidence accorded with the facts set forth above. He added that the gas-bracket was about 5 feet from the floor. There was a chair just below the gas-pipe, so that the child could have got upon the chair and turned it on. Mrs. M'Anally was able to turn the gas on and off, but she had a decided objection to gas light, and always carried a candle to her room. He had never heard from his wife that Mrs. M'Anally used the gas. Dr. Tomb described his ineffectual efforts to resuscitate the child. He attributed both deaths to gas poisoning; and he said that if the woman was suffering from asthma she would succumb more quickly than a healthy person. He examined the gas-tap in the room, and found it to be a proper one. Professor J. Lorrain Smith, of Queen's College, Belfast, deposed that he had seen the bodies of the deceased, and obtained some of their blood, which he had not had time to examine. There was nothing to contradict the opinion expressed by Dr. Tomb that gas poisoning was the cause of death; but he must examine the blood before giving an opinion. The natural colour of blood was red; but if saturated with carbon monoxide it was pink. By the quality of the pink colour one could tell how much gas had been breathed. Two kinds of gas were used for illumination in Belfast—coal gas and water gas; and the two were mixed together. The proportion of water gas varied; but he should think it was about 40 per cent.—sometimes more, sometimes less, depending, to a great extent, upon the state of the atmosphere. Roughly speaking, Belfast coal gas contained 5 per cent. (sometimes less) of carbon monoxide; in the water gas, the percentage varied, being sometimes more than 40 per cent., or eight times as much as in the coal gas. Between 3 and 4 per cent. in the atmosphere was fatal to life. Witness went on to say he had been working at the question of coal gas and water gas for a good while in the laboratory; but, in view of the inquiry being conducted by the Home Office Committee, he would rather not express any opinion on the matter just yet. The Coroner said: "You have no doubt that water gas is eight times more poisonous than coal gas?" Witness replied: "I have no doubt of it." He added that certainly it was essential to have a proper admixture of the two kinds of gas. This closed the evidence.

In addressing the Jury, the Coroner said the inquiry was a very important one, and he was pleased they had had the assistance of Professor Lorrain Smith in the matter. The first thing the Jury had to find was what was the cause of death. Dr. Tomb said that, in his opinion, it was gas poisoning; and Professor Lorrain Smith said there was nothing in the case to negative this opinion. But, of course, he could not scientifically tell until he had examined the blood. Whether it was coal gas or water gas which was used in the city supply, there was no doubt whatever that if the gas-tap in a bedroom were left turned on at night, the persons in the room would be suffocated ultimately, if relief were not given in time. An important point arose in the inquiry, and that was whether there was too much of the poisonous element of carbon monoxide in the city gas supply; and it might be well for the Jury to attach a rider to their verdict, requesting the Corporation to have experiments made from time to time to ascertain the exact quantity of this poisonous element there was in the gas, and if there were too much, means should be taken to prevent it. But there was one thing that could be done in every house in which gas was used, and then there would be no more gas-poisoning cases, and that was to use only lighted candles in bedrooms, and to have the gas turned off at the meter every night. He was sorry to say there were very few cases in which the gas was turned off at the meter at night; but this would be a simple plan to prevent these regrettable fatal accidents.

The Jury returned a verdict to the effect that gas-poisoning was the cause of death, and appended the following rider: "We consider that, in the public interest, the Corporation should have experiments made to ascertain the amount of carbon monoxide in the gas of the city, with the object of preventing too high a percentage of it, and of remedying same if it be found to exist."

THE CAMBERWELL VESTRY AND INCANDESCENT GAS LIGHTING.

At the Meeting of the Camberwell Vestry last Wednesday, the General Purposes Committee submitted the two letters from the South Metropolitan Gas Company given in the "JOURNAL" for the 27th ult., and made the following recommendations: "(*a*) That the offer of the Gas Company be accepted upon the conditions as set forth in the letter of Dec. 3, as amended by the letter of Dec. 14, 1898, and upon the following additional conditions: That the change is completed in about a year, and that whenever the illuminating power of any of the several burners falls one-third below the standard for incandescent burners set out in the letter of the Gas Company of Dec. 3, the Company shall replace the old mantles with new ones. (*b*) That it be referred to the General Purposes Committee to determine the order in which the streets are to be lighted by the new process, and what burners are to be used." Colonel Vincent, the Chairman of the Committee, asked for leave to take the report back, inasmuch as a further letter had just been received from the Company stating that they did not make it a *sine quâ non* that the whole of the lanterns should be altered; but that, if the Vestry decided, in certain streets, to adapt the present lanterns, there would be no difficulty, and the alterations could be made at a small charge—the Company carrying out the work. The idea of the Directors was to limit the Paris lanterns to the great leading thoroughfares, and to fix the No. 3 burners in some of the better streets. There was no opposition to the proposed reference back; and it was accordingly agreed to.

THE BARNARD CASTLE DISTRICT COUNCIL AND THE GAS COMPANY.

The Company's Accounts Wanted.

A discussion which took place at the last monthly meeting of the Barnard Castle District Council revealed a condition of things which may eventuate in what, in diplomatic circles, are called "strained relations" between that body and the Gas Company. On the occasion referred to, the Sanitary Committee submitted a recommendation that the Clerk should apply for a copy of the Company's accounts, and for "full information as to the formation of the present Company;" and it was suggested that the financial statement should be laid upon the table every year. The wording of the recommendation indicated that the Committee presupposed compliance with the requests the Council were advised to make. Curiously enough, the recommendation proposed was supported, "with the greatest pleasure," not by an outside opponent of the Company, as one would surmise, but by an original shareholder who had been a Director, and had taken an active part in the management of the works. This gentleman—a Mr. Hilton—stated that he had applied time after time for a balance-sheet, but had never been able to get one. On a certain occasion when he proffered his request, the reply he received from the Chairman was that they did not produce a balance-sheet, as people would "want the gas for less money." In other words, as Mr. Hilton said, they had been at a loss to get through their revenue, and if they were to supply their gas for nothing, it would be a benefit to themselves and a saving to the town. These remarks brought up the Chairman of the Company (Mr. Richardson) who said it was eighteen months since the Clerk first wrote to their Secretary asking for a balance-sheet. The Directors looked into the matter, and decided that they were not compelled to give it. The Company had been so long established that the Council were not entitled to a balance-sheet. Mr. Hilton was a shareholder; and he could go and see the accounts whenever he pleased. Mr. Hilton pointed out that the present Company, which was a limited liability undertaking, was only an offshoot of the old one. As for going to see the accounts, he had something else to do. They wanted them there, so that the Council could inform themselves as to what was going on. In his opinion, with all deference to his friend Mr. Richardson, the conduct of the Company was a regular "hole-and-corner" business all through. The Clerk (Mr. J. I. Dawson) observed that the matter at the outset arose in relation to accounts which had to be exhibited by clerks to local authorities on the 25th of March, and were to include balance-sheets to be furnished by gas companies to bodies like the Council, showing the expenditure and the income for the year. Where the profits exceeded a certain figure, the price of gas must be lowered. The profits in any case could not exceed 10 per cent. He accordingly applied for the Company's balance-sheet, and was politely written to to the effect that the constitution of the Company was such that they need not comply with the Gas-Works Clauses Act, 1847. At that time he did not know that the Company had been re-formed, and came within the limits of the two Acts of Parliament. The Company were on the horns of a dilemma. They had no right to open the streets, or to have a single gas-main in any of them, if they were not under any Act of Parliament. If, on the other hand, they had statutory powers, they were bound to furnish the Local Authority annually with a balance-sheet showing the expenditure and profit, and how it was arrived at. The Act of 1847 had to be read with the Act of 1871. Mr. Hilton said if the Company took his advice they would let the town have the gas for nothing, and they would then meet them as leniently as they could. It would get them out of the dilemma, and would suit the purpose of the Council. All the buildings which had been put up since he and the old Manager (Mr. Willie) had charge had been paid for out of revenue. The shareholders always had their 10 per cent.; and the Company did not know what to do with their money. Mr. Richardson said he should like to ask any tradesman in the town whether 10 per cent. was an exorbitant return for the capital at stake in his business. The policy of the Company had been that every penny surplus had been spent on the town, which had gas at 2s. 6d. per 1000 cubic feet; and he defied them to point to another place in England of the same size which sold gas as cheaply. The town was entitled to the first benefit, after the Company

got 10 per cent.; and he should always advocate it. They were not trying to get out of the public anything which the Company were not entitled to; and the dividend was only a fair profit upon the capital invested. In the early days of the Company, the shareholders took a very low dividend; and the revenue was applied to putting the works in order. Mr. Hilton, referring to Mr. Richardson's statement that the surplus had gone to benefit the town, asked where the money had come from for the structural enlargements which had been carried out. The hundreds of pounds which had been spent on new buildings simply added to capital money which might have gone to the public. Mr. Richardson said that, under the Articles of Association, the Company could have paid 15 per cent. Mr. Barningham moved—"That the Clerk be requested to write to the Gas Company for a balance-sheet, according to Act of Parliament, and that we have full information as to the formation of the Company." Mr. Hilton seconded the motion; and it was carried.

DAMAGE TO GAS-WORKS BY THE RECENT GALE.

Considering the violence of the gale with which the country was visited last Thursday, it is gratifying to record that no accounts have reached us of fatalities resulting through damage to gas-works. At Stoke, however, the retort-house sustained rather serious injury. About seven o'clock, while the men were at work, a loud cracking and crashing noise was heard. So strong was the wind, that the gable end of the building was giving way under its force; and it fell with a great crash—a portion of the roof at the same time collapsing. Fortunately the men were not placed in any danger. Their task, however, in keeping the works going, and furnishing a full supply of gas, was an extremely difficult one. The Manager (Mr. W. Prince) was on the premises when the crash occurred, and knowing that the town might be placed in darkness if the men did not remain, encouraged them to stick to their work. With characteristic British pluck they did so, in spite of all difficulties. The damage is roughly estimated at several hundred pounds.

The town of Littlehampton is at the present time in a sad plight through flood. Owing to the excessive tides and boisterous weather, the banks of the River Arun gave way on Friday night, and the water poured into the gas-works and completely flooded them, extinguishing all the fires, and filling every place with water. The result was that the town was thrown into darkness on Saturday; and it may be some days before a supply of gas can be furnished, as the banks will have to be repaired, and the water pumped out of the works, which are now a complete island. The Manager (Mr. A. W. Elton) and the men have had to walk about in water nearly up to their waists. Some of the shops in the town were lighted with candles, all kinds of oil-lamps, and even Chinese lanterns suspended in front of the doors, and small decorative oil-lamps of all colours wired round the windows; but away from the High Street the town presented a truly desolate appearance. The Directors of the Company have issued a notice expressing regret at the unavoidable cessation of the gas supply, and promising its restoration as soon as possible.

ELECTRIC LIGHTING NOTES.

The Rhyl District Council are among the applicants for Electric Lighting Orders. They estimate the cost of providing an installation for the town at £10,000.

The Garston District Council have, after two long debates, agreed to transfer their Electric Lighting Order (obtained in 1897) to the British Insulated Wire Company.

The past year's trading of the Burton-on-Trent Corporation Electric Light Department resulted in a loss of £992, principally due, it is said to the heavy repayments on loans.

The electric light has been installed at the Chamber of Deputies, Paris, under the direction of a Committee presided over by M. Mascart, the well-known electrician. There are 4610 lamps in all. Gas-engines are employed to drive the dynamos, and a battery of accumulators is used to store the current. The motors are started by sending a temporary current through the dynamos from the accumulators.

During the proceedings of the Yarmouth Town Council last Tuesday, an unexpected diversion was effected by most of the electric lights being suddenly extinguished, owing to a fuse having burned away. The Mayor (Dr. Ryley) remarked, amid a good deal of merriment, that the Council could transact business in the dark. The gas was lighted at the two standards left in the room, and thus sufficient illumination was provided for a time. After some twenty minutes the current was restored.

The Whitby District Council will have to bestir themselves, or they stand a good chance of losing their Electric Lighting Order, which cost them between £400 and £500 to obtain. As a matter of fact, the time within which they should have made a commencement in carrying out an installation has expired; but the Board of Trade have consented to defer considering the revocation of the Order for twelve months. A Committee of the Council have been asked to give attention to the matter, and report upon it.

In the electric lighting scheme which is being carried out at Canterbury, the Corporation originally allowed £670 for the wages of the requisite working staff; but they overlooked the important fact that a resident electrical engineer would be needed to take charge of the undertaking. The sum mentioned above has now, in consequence, advanced to £870. It was said at a recent meeting of the Corporation that there had been some misunderstanding. A peculiar circumstance is that these misunderstandings with corporate bodies undertaking ambitious schemes never result in an *excessive* estimate—at any rate, that was the impression of the "South Eastern Gazette."

Some time ago the Llandudno District Council entered upon an agreement with Mr. A. H. Preece for the laying down, on a site near the gas-works, of an extensive electric lighting station. This was completed and opened by Mr. T. T. Marks, Chairman of the Council, about two months ago. Since then Mr. Preece and the resident Electrical Engineer (Mr. Morton) have been busy in completing the construction of a refuse destructor—one of the Beaman and Deas type—designed to deal with 60 tons of refuse per twenty-four hours. This was also formally inaugurated by Mr. Marks yesterday week. The total cost of the electric lighting plant, including the destructor, is close on £30,000, of which the destructor accounts for about £7000.

There were two or three interesting points on the subject of electric lighting in the report which the General Purposes Committee submitted at the meeting of the Lowestoft Town Council last Tuesday. In the first place, it was stated that Mr. W. C. Hawtayne had submitted his estimates for electric lighting (including the cost of providing extra mains, culverts, and a larger generating station for a light electric railway); and the total was £26,000. A site for the electric light station and a dust destructor was fixed upon; but a suggestion of Mr. Hawtayne that a deputation should visit Brighton to examine and report as to the system of charges in force there, was deleted from the report. It was also announced that the total amount of costs incurred in promoting the Electric Lighting Order was £206 11s.

A meeting was held last Thursday, at the Westminster Palace Hotel, of a Special Committee appointed by the Association of Municipal Corporations to protect the interests of the towns of the country against the attack of electric light and power companies during the coming session. The proceedings were private; but it is reported that the Committee unanimously resolved to advise the Local Authorities affected to cause the various Electricity Supply Bills to be opposed at every stage. The Committee will draw up a statement showing how the interests of the ratepayers will be seriously affected; and this will be forwarded to every Member of Parliament, with a request for help. The facts will also be laid before every Corporation, District Council, and Parish Council in the country, and their co-operation solicited.

During the Welsh coal strike, complaints appeared in the Exeter papers of the nuisance caused by the emission of dense smoke from the chimney of the Exeter Corporation electric lighting station. The strike has long been ended, but the complaints continue. At the meeting of the City Council last Wednesday, a memorial was presented from people resident in the neighbourhood of the works, as well as the owners of property in the district, complaining not only of the smoke nuisance, but of increasing noise and vibration. The memorial was referred to the Electric Lighting Committee; but it is not clear that they can do anything which will remedy the evil, short of removing the plant to another place. The present site is admittedly unsuited for the purpose, and allows no room for extensions which are urgently needed, though the Committee recently reported that they thought more plant might be crowded upon it as a temporary expedient.

An application by the Nottingham Corporation to borrow the large sum of £150,000 for purposes of their electricity undertaking was inquired into by Lieut.-Col. A. C. Smith, of the Local Government Board, on Wednesday last. From the statements made by the Town Clerk (Sir Samuel Johnson), the City Engineer (Mr. Arthur Brown), and the Electrical Engineer (Mr. H. Talbot), we gather that the previous loan of £85,000 has been expended; and the Council cannot with the present plant keep pace with the demand for electricity. Land containing an area of 2470 square yards has been purchased for the additional works. The contract for new buildings amounts to £24,000. At present there are between 14 and 15 miles of mains; and after the proposed extension the length will be about doubled. In the scheme, £16,000 has been allowed for street lighting, providing for 160 arc lamps. The present horse power amounts to 2200, which it is intended to increase to 6300. The department has now 780 customers.

Mr. A. A. Voysey, the Electrical Engineer to the Corporation of London, in a recent report to them on the electric lighting of the City, states that in the main streets there are 493 arc lights. The total number of lamp failures in the past year was 1466, the average time of extinction per lamp being 236 minutes; and 98 lamps were late in starting, the average time being seven minutes. A sum of £352 was paid in penalties by the Electric Lighting Company for failures and lateness in starting. No arrangements for testing the supply of electricity to the public lamps have yet been made; but Mr. Voysey says there is no reason why the provision of the necessary instruments should be much longer delayed. The private electric supply last year amounted to an equivalent of nearly 300,000 lamps of 8-candle power. There were 78 instruments submitted to the Engineer for testing—the bulk of them being meters. Of these 43 per cent. were correct, and 57 per cent. were either too slow or too fast. The cause of the variations was in the generating machinery.

About six o'clock on Monday evening last week, the supply of current from the Sheffield Corporation Electric Light Works ceased; and the premises of users were plunged into darkness for half an hour. Cruel fate! Only two days later, Alderman Styring had to appear before the City Council for the first time as Chairman of the new Electric Lighting Committee; and nearly his first words were to request the indulgence of the consumers in regard to this stoppage, which, he confessed, was a serious one. He explained that the "technical" cause of the stoppage was what was called a short "service" of current behind the switchbox. It was, he added, the most serious stoppage which had occurred for a year or two; and it was one which was quite beyond the control of anybody connected with the undertaking. Everything was done that could be done; and he believed so far as the centre of the city was concerned, the stoppage only lasted about seven minutes. [This statement was met by cries of "No, no."] He promised that the Committee would spare no expense to prevent a repetition of the difficulty.

The electric lighting of the City of London was a subject of discussion at the meeting of the Corporation last Thursday, when a resolution was read from the wardmote of Aldersgate against the purchase of the electric light undertaking at a premium, and in favour of a competing supply. Mr. Brooke Hitching, in opposing a motion that the resolution be sent to the Streets Committee, said they might as well put it under the table, for the Committee had no sympathy with the citizens' troubles in electric lighting, and not one of the members knew anything of the science of electricity. He should take an early opportunity of moving that all references on electric lighting should be referred to a Special Committee appointed for the purpose of going into the whole subject. Mr. Sayer defended the Committee from the charge of neglect. Mr. Johnson said something would soon have to be done. The private lighting was execrable, and the public lighting was dangerous, as many of the lamps went out, with the result that, had it not been for the shop lighting, the streets would have been in darkness. The lamps, too, were in such a dirty condition that the lights were obscured. Then, again, there were no means of ascertaining whether the Corporation received the amount of current for which

they paid. They were completely in the hands of the Company; and the sooner they got out the better. After some further discussion, the resolution, with others on the same subject from the wardmotes, was referred to the Committee.

Some difficulty is being experienced by the Corporation of Devonport in finding a site for their electrical station. Nearly all the foreshore of Devonport has been appropriated by the Admiralty; and negotiations for one of the few possible sites with a water frontage have failed because the owners have another use for it. Under these circumstances, the Committee have been compelled to select another situation, to which possibly railway communication may be obtained, as it is in close proximity to both the Great Western and London and South-Western lines. At a meeting of the Town Council on Thursday, the Mayor (Mr. W. Hornbrook) suggested that the works would be an ornament to the neighbourhood in which it was proposed to place them. This drew an indignant remonstrance from several members of the Council. It was pointed out that the works were to be put up in the midst of a residential district; and Mr. J. Goodman said it was an insult to people living there to speak of them as ornamental. So far from the station being ornamental, the smoke and vibration would be too disagreeable to describe. The Town Clerk tried to mollify the opposition by explaining that there was no intention to erect a dust destructor at the place. With what might be regarded as remarkable temerity, he predicted that there would be no nuisance of smoke from the chimney of the works; while as to vibration, electrical engineers were now prepared to cope with it. The Town Clerk's assurances seem to have been sufficient, at all events for those who do not live in the district in which it was intended to plant the works; but a motion to refer the subject back to the Committee for reconsideration was adopted.

Some sensible remarks on the association of electric lighting works with dust destructors are contained in a letter which the Edmundson Electricity Company have addressed to the Penzance Corporation. It will be remembered that a month ago the Corporation—in opposition to the advice of the Lighting Committee, who had had the matter under consideration—decided to oppose the application of the Company for a Provisional Order. One of the reasons of the Corporation's action was that, by taking in hand the electric lighting themselves, they might combine with it a destructor, and save £200 a year in the cost of disposing of the refuse. The Edmundson Company now wrote that they had lodged their application without the special clauses which they offered to the Corporation as a condition of not being opposed; but they still hoped the Council would, on further consideration, arrange terms. As to the suggestion that a scheme for disposing of the refuse of the town should be combined with the electricity generating station, the Company expressed the opinion that it could not possibly answer in a town like Penzance. If a destructor were required, it would be much better to put it up independent of the electricity plant, as the value of the small quantity of steam which would be generated would not be worth considering, and it was certain that a site which would be suitable for a dust destructor would involve very heavy extra expenditure in connection with the electric lighting plant. As an additional inducement to a favourable consideration of their application, the Company informed the Council that no town in England of the size of Penzance had been able to make electric lighting pay within the first two or three years. The Council turned a deaf ear to all these arguments, and did not reply to the Company.

The first minutes of the Electric Lighting Committee of the Sheffield Corporation were submitted by Alderman Styring at the meeting of the City Council last Wednesday. The price paid for the undertaking was £261,000; but now that the Committee have entered into possession of the works, they find that things are not in so satisfactory a condition as they could wish. For instance, in order to meet the demands upon them, it is necessary to work the machinery at its full capacity—in other words, there is no spare plant. Speaking upon this matter, Alderman Styring said he was quite sure members of the Council would agree with him that this was a state of things which ought not to exist. The Company had been exerting themselves for some time past to remedy it; and new and powerful machines had been put down. He referred to a 300 kilowatt and a 600 kilowatt machine, which should have been fixed by the end of 1897. But, owing to the engineers' strike, the Company were unable to obtain the machines; and they were not actually started until two or three months ago. Then, when they were set to work, it was found they would not yield the power they were guaranteed to produce; and they would at once have been taken in hand and put in order, only the demand for current was so great that it was necessary to get as much power from them as possible, in order to keep the undertaking going. Other machines had been ordered, and were in course of being delivered; and there was no doubt that, in the course of the present year, matters would be put in such a position that all requirements would be duly met. He then turned to a more encouraging aspect of the business—stating that the lamps wired during last year were 17,865, as compared with 13,565 in the previous twelve months. This was an increase of 22 per cent., and brought up the total number of lamps to 73.853. The current sold in the year was 978,086 units, compared with 738,499 the previous year; being an increase of 32 per cent. Regarding the finances, the gross revenue from current and meter-rents was £17,104, as compared with £14,823 10s. the previous year. This was a very satisfactory increase indeed, and especially so when they remembered that the price of current was in March last reduced from 5d. to 4d. per unit, notwithstanding which the revenue had overtaken and even exceeded the previous year's. The Company carried on the undertaking last year on behalf of the Corporation; and one of the conditions was that the Company should receive 10 per cent. interest on the capital. This had absorbed £9712; and in addition there was to be paid out of the revenue the debenture interest, £1125—making a total payment out of the revenue of £10,837. He believed there would be, after making the payments mentioned, no less than £3000 clear profit on revenue account for the Corporation as the result of the year's working. The minutes were confirmed.

Water-Meter Rents and Charges at Stafford.—On the recommendation of the Water Committee, the Stafford Corporation last Tuesday agreed to abolish rents for water-meters, and to supply water at the rate of 1s. 6d. per 1000 gallons up to 10,000 gallons, and 1s. 5d. from 10,000 to 15,000 gallons.

LORD FARRER ON "LEGALIZED ROBBERY" IN WATER SUPPLY.

The proposals contained in the Woking Water Company's Bill have aroused the opposition of the influential property owners and residents in Shere, Albury, and the Tillingbourne Valley generally. A meeting to consider the subject was held at Shere on Monday last week; and Lord Farrer gave to the proceedings something more than local importance by the expression, in vigorous language, of his views on the question of the withdrawal of water from one district for the supply of another. Mr. R. M. Bray, Q.C., presided, and gave a concise statement of the objects of the Bill—among them being the provision of a pumping-station at Shere and another at Albury, and the taking of water thence to the parish of West Clandon. He also read letters from Lords Ashcombe and Rendel, Mr. Justice Vaughan Williams, and other gentlemen in favour of opposing the Bill. Lord Rendel wrote: "It seems to me something like filching our property for private individuals to buy just land enough for wells and 'drifts,' and so to deprive large areas of other people's land of their water, merely in order to sell it to the owners at a profit." The first resolution was moved by Lord Farrer. It was to the effect that the meeting was of opinion that the proposal contained in the Company's Bill—to sink deep wells in the Valley of the Tillingbourne, and to use the water pumped from those wells for the supply of districts outside the valley—was one which should be resisted by all the inhabitants, and pledging those present to use all the means in their power to give effect to such resistance. He said his attention was originally called to this subject when he was at the Board of Trade, and afterwards when he was for a time Chairman of the Water Committee of the London County Council. He was then struck by the hardship—he might say the iniquity—of the present public and private law, and the iniquities committed under that law, upon the inhabitants of country districts which surrounded the great cities. Mr. Bray would tell them that the law, which was originally reasonable, was this: That any person might sink a well upon his own ground, and his neighbour might sink a well upon his ground also, and if one well took away the water from the other well, unless there was a distinct channel between them, neither had any remedy against the other. That was reasonable enough as long as it was a question between two adjacent landowners. They were not likely to plunder one another to any considerable extent, and to have prevented either from taking water from his own land might have been a hardship. But when a wealthy water company, making large dividends out of the supply of a great town—London, for instance—put down deep wells in a neighbouring county, drained the whole supply from under the county, so as to lower the springs and wells in the county, and to diminish the flow of the streams, and that without the slightest compensation to the county it took the water away from, and made enormous dividends out of the supply, then he had no name for that but legalized robbery. As an instance of what he meant, Lord Farrer quoted the case of Hertfordshire and London, and pointed out that Parliament, listening to the representations of Hertfordshire, was not willing to give the London Water Companies leave to get what they wished; and they had had to go to the Thames. He mentioned this as an encouragement that Parliament would listen to complaints of this sort, and would prevent water companies from committing such injustice. Sir Herbert Barnard, who is a Director of one of the London Water Companies, seconded the resolution, which was unanimously passed. At the close of the meeting, petitions to the House of Lords and the House of Commons against the Bill were signed by a large number of those present. The petition pointed out the injurious effect which it was contended the works proposed would have upon the Tillingbourne Valley, and stated that Shere and Albury, which were proposed to be included in the Company's limits, had already ample means of supply, and neither needed nor desired the service of the Company.

THE DERWENT WATER SCHEMES.

Attitude of County Councils.

At the meeting of the Derbyshire County Council last Wednesday, the Parliamentary Committee were granted full power to take whatever steps they deemed necessary in reference to the promotion in Parliament of the Water Bills of the Corporations of Derby, Leicester, and Sheffield. The report of the Public Health Committee dealt with the same subject, and gave rise to a long and animated discussion. Alderman G. H. Strutt, in introducing the report, said they had been in communication with the Derby Corporation, whose frankness and straightforwardness he desired to acknowledge. There was not everything in the Derby Bill that they had hoped for; but from the spirit which animated the Corporation, he was tolerably confident that in time they would get certain clauses inserted which would be satisfactory to all parties. Sooner or later this water would be taken, if not with the sanction of the Derbyshire County Council then without it; and in the latter event, they would get no advantages in return. Therefore they should throw in their lot with the promoters who were most likely to give them good terms, and meet them in the friendliest manner. Without hesitation, he asserted that the authority most likely to help the county of Derby was the Corporation of Derby. Therefore he advised the County Council to stand shoulder to shoulder with Derby against all comers. Alderman Waite, speaking for the Association of District Councils in Derbyshire (of which he is the President), criticized the action of the Public Health Committee, and objected to the Derbyshire County Council supporting the Derby Bill as it at present stood, on the ground that the inhabitants of the county would have to pay too dearly for their water. In support of his argument, he mentioned that whereas the capital asked for by Derby was £7,500,000, Leicester, which had so much further to carry the water, only wanted £4,144,000, and Sheffield £2,175,000. One of these three estimates, if not all of them, was surely wrong. The Derby scheme worked out in cost to 6·57d. per 1000 gallons, whether supplied to Derby or to the outside district, whereas the expense to Leicester would only be 3·63d. per 1000 gallons, and to Sheffield 2·26d. Alderman Strutt, in reply, reminded his hearers that the proposed charge of 4 per cent would not be levied upon

the capital named in the Bill, but upon the capital actually expended on the works. Derby had named 7½ millions, knowing perfectly well that such a sum would never be required; and so far from increasing their estimate, the Derby Corporation had come to the conclusion that it was too high. Indeed, he was in a position to state what was perhaps not generally known—viz., that Derby had amended the Bill to the extent of reducing the capital from £7,500,000 to £5,790,000, which statement destroyed the value of Alderman Waite's figures of comparison. Mr. J. D. Wragg suggested the advisability of the various conflicting interests endeavouring to compromise, and thus spare the ratepayers the expense of going to Parliament; but Mr. Alderman Strutt pointed out that the time for compromise had gone by—the various Authorities having now decided to fight on their merits. The Committee's report and recommendations were adopted.

The West Riding County Council had a number of Bills under consideration the same day; among them being those of the Sheffield, Leicester, and Derby Corporations. Referring to them, the Chairman (Alderman C. G. Miles Gaskell) pointed out that the Authorities named were competing for the upper reaches of the River Derwent, and proposed to construct water-works of great magnitude. It would be seen that these "foreign" counties, so to speak, proposed to take a portion of the West Riding water supply in favour of local authorities in their own districts, to the exclusion of the West Riding. This appeared a very dangerous provision, and one they ought to guard against. On the recommendation of the Law and Parliamentary Committee, it was decided to petition against the Bills.

THE PROPOSED EXTENSION OF THE READING WATER-WORKS.

Local Government Board Inquiry.

At the Reading Town Hall, a short time since, Mr. R. H. Bicknell, one of the Inspectors of the Local Government Board, held an inquiry in regard to an application by the Corporation for a Provisional Order "to partially repeal, alter, or amend the Local Acts in force in the borough, relating to water-works, as altered by the Acts confirming Provisional Orders of the Local Government Board of the years 1891 and 1892, or some or one of such Acts, so as to enable the Corporation (1) to purchase, by agreement, land in the parish of Tilehurst, outside the boundary of the borough and outside the limits within which the Corporation are authorized to supply water, and to construct upon such land a high-level service reservoir, and to lay, partly within and partly without the borough and the limits referred to, mains for connecting such reservoir with the existing water-works of the Corporation, and in other respects to extend and improve such water-works; and (2) to borrow additional moneys for water-works purposes." The Town Clerk (Mr. H. Day) represented the Corporation; Mr. R. Simmons appeared for the Bradfield District Council, and Mr. Duncan Witherington for the Tilehurst and Pangbourne Water Company.

The Town Clerk having read the notice for holding the inquiry, the Inspector asked whether there was any opposition to the application. Mr. Witherington said he was opposing on behalf of the Tilehurst and Pangbourne Water Company. He would like to ask the Town Clerk for a copy of the draft Provisional Order, as he had not, so far, been able to obtain it. The Town Clerk said the draft Provisional Order did not exist. The Local Government Board prepared their own Orders, and when ready a draft was sent to them. He explained to the Inspector that as soon as he had an intimation of the opposition, he sent to Mr. Witherington a copy of the details as furnished in the statement forwarded to the Local Government Board. He had done everything he could to give the particulars of the application to the Company and the other bodies interested, with whom he had been in communication. He had also acted upon a suggestion contained in a letter from the Local Government Board to the effect that, if necessary, clauses could be inserted in the Order, as agreed upon by the different parties. The Inspector said he hoped the Company would make any suggestion that they thought fit in this case. If they would tell him exactly what they wanted, and the Local Government Board considered that their wants were reasonable, they would themselves insert the clauses. Mr. Witherington said the Company did not want the Corporation there at all. The Inspector said he had no doubt that if the Local Government Board thought the Corporation should not be there they would not allow them to go.

The foregoing preliminaries having been settled, the Town Clerk proceeded, in answer to the Inspector, to state that the borough covered an area of 5878 acres. The total area supplied from the water-works was practically the same, except about 2000 acres at Caversham. The population at the last census was 60,054; but it was now estimated at about 69,000. The number of persons receiving a supply of water at the last census was about 65,000; and now it was estimated at 75,000. The annual assessment value of the borough was £324,927. He then went on to relate the history of the Reading Water-Works from 1851, when the scheme came into existence to supply the borough and the immediate neighbourhood of Sonning, Earley, Whitley, Tilehurst, &c. He referred to subsequent proceedings for Provisional Orders for extensions in 1868, 1870, 1887, and 1891. Since the year 1871, there had been a great development in the high-level districts; and in order to meet the need which had been gradually becoming more urgent, the Corporation proposed to improve the high-level supply. For this purpose, they required the further powers set forth in the notice of inquiry. It was proposed to erect the new reservoir on the highest level in the neighbourhood. The amount for which new borrowing powers were sought was £50,060, which included £3500 for new mains. Mr. A. T. Walker, the Water-Works Manager to the Corporation, detailed, by the aid of plans, the extent of the new works. He said the reservoir would be built of brick and cement, with a brick arch covering and soil on the top; and it would be ventilated by means of ventilators fixed to the arches. It would be constructed in two sections of 2½ million gallons each. It was intended to have a depth of 20 feet to the water-level—8 feet would be excavated and 12 feet above ground. The estimated cost was £17,420, which was subject to certain deductions. The additional boiler, engines, pumps, and boiler-house would cost about £6950. Mr. Oswald Brown said he had examined the plans produced, and, with the alteration he had made, agreed that the works would be adequate to meet the demands upon them. The estimates put in were sufficient to cover the various items. The Town Clerk closed the case for the Corporation by asking for the insertion of a clause in the Order allowing the longest possible period for the repayment of the money.

The opposition of the Water Company was then stated by Mr. Witherington. He said they objected *in toto* to the Corporation coming within their area for water. The Company put themselves to great expense in establishing a water scheme for their own district, which was of considerable extent, and now the Corporation came to try and take the best situation they had at Tilehurst. Moreover, the Corporation wanted to lay their pipes in the road used by the Company for the purpose; and this would lead to a great deal of correspondence and disturbance, because they would have to cross each other's track, so that the whole scheme would be attended with difficulty. If the Inspector was of opinion that the Corporation had made out a fair case for obtaining the Order, then he (Mr. Witherington) would ask the Local Government Board to introduce protective clauses to this effect: The Company to have notice before the works were commenced, and to have power to do the work themselves; and the Corporation to be prohibited from supplying water within the Company's area. The Inspector observed that the Company were already protected to this extent by their own Act. Mr. Witherington further asked that there should be a clause so that there would be a mutual supply, fixed by arbitration, if the Corporation or the Company had an excess of water. The Town Clerk said there were powers under which they could agree; but he thought it was an unknown thing for the Local Government Board to give compulsory powers to anybody. The inquiry then closed.

THE WATER SUPPLY OF PARIS.

Projected Improvements.

In view of the inquiry now in progress in regard to the supply of water in the Metropolis, and of the action of the London County Council in the direction of obtaining control of this important service, it may be interesting to reproduce, from a recent number of the "Engineer," the following account of what is being done towards improving the water supply of Paris:—

The Municipal Council of Paris have lately appointed a Commission to examine the projects which have been presented for bringing fresh supplies of water to the city; and when the final report of this Commission shall have been approved of, the Council will vote the necessary credits for carrying out a vast system of water distribution. At present the average daily consumption of water within the city is 550,000 cubic metres, representing 220 litres (48·40 gallons) per head of the population. With the exception of Rome, this is the largest consumption of any European capital; and even among the leading cities of the world Paris occupies a fairly high rank in the abundance of its artificial water supply. Notwithstanding the relative completeness of its system of water distribution, Paris has often found itself short of water during times of long drought, when it has been necessary to supplement the supplies from the filtering-beds and from the sources of the Avre, the Vanne, and the Dhuis, with water drawn direct from the Seine. Not only is it absolutely indispensable to look to further sources in order to provide against such contingencies, but it is evident that the city must be thoroughly equipped with an abundant water distribution by the time of the Exhibition of 1900, and, moreover, the constant increase in the population is a factor which enters seriously into the calculations of engineers. At the present rate of progress, it is estimated that in 1930 the population will be 3,300,000; but in view of the fact that the boundaries cannot extend so long as the present fortifications exist, it is not expected that this figure will ever be exceeded. This is the basis taken by engineers in calculating the importance of the system of water distribution to be carried out during the next twenty years.

Of the 550,000 cubic metres of water distributed every day in Paris, there are only 253,000 cubic metres available for domestic purposes—that is to say, 203,000 cubic metres of spring, and 50,000 cubic metres of filtered water. This quantity would be quite sufficient at all seasons of the year if it were not for the considerable waste, for which it is not easy to provide a remedy. The Paris engineers do not think it is possible to devise means of enforced economy in water consumption; and the only alternative, therefore, is to augment the supplies. It is believed that something may be done in this direction by reducing to a minimum the loss in the main conduits. Seeing that the length of the Vanne conduit is 173 kilometres—that of the Dhuis and the Avre being 131 and 102 kilometres—it is evident that a good deal of water must be lost during conveyance over such long distances. According to recent estimates, the loss from leakages and defects in the conduits amounts to about 25 per cent. in the United States and 30 per cent. in England; and it is certain that in France the loss is no less. It is therefore proposed to increase the grant for the inspection of the conduits, in order that any defects may be promptly made good. By the time the population reaches its maximum—that is to say in 1930—it will be necessary to augment the supply of pure water by at least 70,000 cubic metres a day. The sources of the Loing and the Lunain will provide from 40,000 to 50,000 metres, and the remainder may be obtained from the filtering basins or by utilizing certain other river sources within a convenient radius of the city. The Municipal Council, however, do not propose to confine themselves to this limit, but to give an ample margin by providing a daily supply of 400,000 cubic metres of pure water, which will represent 120 litres (26·40 gallons) per head of the population. This would be more than sufficient for the domestic needs of the city.

Several projects have already been presented to the Municipal Council for obtaining the additional 160,000 cubic metres necessary to make up this total, and they may be grouped under three heads—viz., the utilization of new springs, the construction of filtering-beds, and the bringing of water from the Swiss lakes. This last-named project has been strongly advocated by certain engineers, who point out the alleged enormous advantages that would accrue from the conveyance of practically unlimited supplies of water from the Lake of Geneva. It has been estimated that 2 million cubic metres a day would thus be available for Paris. The difficulties of the scheme, however, are so considerable that it has been

rejected by all the Commissions which have reported upon it. Even supposing that the Swiss Government would consent to such a mass of water being taken from the Lake of Geneva, the cost of constructing an aqueduct of 500 kilometres would be no less than £24,000,000; and it would be necessary to re-arrange the entire system of water distribution in the city. Besides this question of cost, it is asked whether any reservoir and conduit could be made strong enough to resist the pressure of such a mass. Since the Bouzey catastrophe, French engineers have begun to exercise more than ordinary caution in dealing with enormous pressures in reservoirs. Again, is it advisable to procure the whole of the water supply from a single source, and thus run the risk of supplies being cut off through an accident to the conduit? A still more powerful argument against the scheme is the poor quality of the water in the Lake of Geneva. Being formed largely of melted snow, the water contains little salts and mineral constituents, and is not so pure as spring water.

The Swiss project having been definitely set aside, the municipal engineers are discussing the various other means of augmenting the water supply. At first it was proposed to make the best of the existing supplies by building an immense reservoir to receive the surplus during the greater part of the year, when the quantity available exceeds the consumption, and thus have an ample reserve during the months of comparative drought. This, however, would have necessitated a reservoir with a capacity of 4½ million cubic metres, and it would cost three times more than the construction (say) of the Dhuis aqueduct. Moreover, the water would be liable to contamination, and might be a source of danger to the health of the city. It is thus preferable and more economical to bring the water direct from new springs. In two years' time, the completion of the works for utilizing the sources of the Loing and the Lunain will suffice for the normal needs by increasing the minimum total of spring water from 200,000 cubic metres to 250,000 cubic metres, and with this additional pressure it will be possible to send the water at all times to the highest points in Paris.

The Exhibition of 1900, however, has rendered it necessary to augment the existing supplies of spring water by 65,000 cubic metres a day of filtered water. As the result of a competition organized a little while ago, the Municipal Council have come to the conclusion that the only way of satisfactorily dealing with the river water is by filtering it through beds of sand. The capacity of the Saint-Maur sand basins is at present 20,000 cubic metres, and this is to be increased before long to 30,000 or 40,000 cubic metres. It is found inadvisable to take more than this quantity from the River Marne; and the new basins are to be established near the Seine at Ivry. Eventually the filtering-basins will have a capacity of 100,000 cubic metres, which will represent a quarter of the entire supply of water estimated to be available in 1930. To complete this distribution of 400,000 metres of pure water, it will be necessary, as already mentioned, to utilize fresh sources capable of furnishing about 160,000 cubic metres a day. The proposal to bring water from the springs of the Aube, the Yonne, and the Seine, which are capable of furnishing all that is necessary, will only be recommended by the engineers as a last resource, owing to the strong local opposition that has to be met with, and the heavy expense that would probably have to be incurred in indemnities and the like. They have therefore revived an old project for utilizing the water which exists in the vast subterranean galleries near Orleans.

For a distance of 41 kilometres before entering Orleans, the River Loire gradually decreases in volume by the filtration of the water through the gravel and loose calcareous beds of the valley, and the water rises again 9 kilometres below Orleans to swell the Loire and the Loiret, where the volume is about the same as at the point where the filtration begins. The town of Orleans obtains its water from this natural reservoir, and it is estimated that Paris might procure no less than 432,000 cubic metres a day; so that not only would the city be abundantly supplied with spring water, but there would be enough for distribution in the suburbs. As this amount represents one-fifth of the volume of the Loire at its lowest water-level, it is evident that such a heavy drain would cause serious inconvenience during a period of drought, especially in view of the agitation now being carried on to render the Loire navigable for vessels of light draught. In order to overcome this drawback, it would be necessary to construct dams across some of the upper valleys of the Allier and the Loire, so as to form reservoirs with a total capacity of 50 million cubic metres, or sufficient to feed the river during a month of drought. The Commission which has already examined this project estimates that the cost of these works will not exceed £4,800,000. According to analyses of water taken from the calcareous beds through which it has filtered, the quality is excellent; but upon this point, as upon many others, the new Commission lately appointed to inquire into all the various schemes will make further investigation before recommending the adoption or otherwise of this important project. In the meantime, it is proposed to build an additional reservoir in Paris, so as to obviate the necessity of using the Seine water for domestic purposes during the hot months of the year, when the heavily-increased consumption coincides with a fall in the yield from the various springs; and it is pointed out that such a reservoir would enable the Council to spread the works over a longer period than would otherwise be possible.

The programme of the Paris Municipal Council to be carried out before 1900 is as follows: The construction of aqueducts from the Loing and the Lunain, which has already been started upon, and is to be completed in two years; the construction of filtering-basins, bringing up the total capacity to 65,000 cubic metres of filtered water a day; the provision of a reserve of river water equal to 130,000 cubic metres a day; the preparation of plans for bringing a fresh supply of 160,000 cubic metres of spring water to Paris; and the carrying out of the works of distribution in the city. It is estimated that this programme will entail an expenditure of about £6,680,000. Of this sum £1,060,000 will be spent upon the Loing and Lunain works, and £1,168,000 upon the enlargement of the filtering-basins at Saint-Maur and the construction of new basins at Ivry. A sum of £101,000 will also be devoted to strengthening the Vanne and Dhuis aqueducts and the acquisition of new springs. After 1900 the works will be carried out in two periods, when it is estimated that £3,120,000 will be spent upon new conduits and reservoirs, £100,000 for the completion of the filtering-basins, and £660,000 for improvements to existing works. As regards the elevating and distributing installations for the water of the Seine, a sum of £612,000 will be spent upon pumping machinery, syphons, reservoirs, and general improvements before 1900, and £1,000,000 will be devoted to completing the system after that period.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The managers of gas undertakings are too busy at present to have time for the transaction of much business of a public nature; and therefore I have difficulty in making up my full tale of "Notes." The weather still continues exceedingly dark, from which I reason that outputs of gas will be very high for December and the first half of January.

A subject of considerable importance to gas managers is to be found in the proposed combination of coalowners. There are few contracts for the supply of coal which have much more than six months to run. A combination would, therefore, be organized just in time to fix prices immediately before inquiries for gas coal would begin to be made. There is every reason to believe that the combination will be successfully launched. It is possible that its object may be rather to acquire solidarity in dealing with the men's representatives than to raise the price of coal; but a united body of coalowners could scarcely fail to find their policy tending in the direction of raising prices. There are, however, limits now to the exacting of higher rates for coal, which did not exist some years ago. Whenever coal gets sufficiently dear, oil-gas plants will be brought into use in greater number; and, besides, coal can be had from foreign countries. Those managers who have not oil-gas plants to fall back upon would therefore suffer most in the event of an advance in the price of coal.

Mr. G. R. Hislop has this week reported to the Paisley Town Council regarding extensions of the gas-works which will require to be carried out next summer. Among these are a new retort-house, with a bench of eighty retorts, an enlargement of the existing condensers, the addition of a pair of Beale's exhausters, a tar-pump, and a new station meter. The total cost, including extensions of buildings, is estimated at £9238. The report is to be considered at the next meeting of the Council.

In Glasgow, the lighting of common stairs in large tenements is attended to by the Corporation, but the cost of gas consumed is paid by the occupiers. The usual practice is that this charge is collected by the owners along with the rents of the houses, and that the owner pays the Corporation. There is nothing to regulate the charge which the owner makes upon his tenant; and there is much grumbling among tenants that they are made to pay more than the landlord is charged by the Corporation. I suppose that if such a custom exists, it will have been adopted by landlords in order to recoup themselves for losses they sustain when any of their tenants take a "moonlight flitting." Whatever be the reason, it is very irritating to the occupiers, a great many of whom are very poor people, to find a shilling or two added to their rent. Accordingly, it is no wonder to find that at a meeting of the Corporation on Monday notice of motion was given proposing a remit to the Watching and Lighting Committee to consider how the Glasgow Police Act of 1866 may be amended so as to render impossible the practice complained of, or whether the reform can be effected without an Act of Parliament.

Several claims upon the Arbroath Gas Corporation were intimated in respect of recent mishaps arising on account of gas-pipes having been fractured by the using of a road-roller on one of the thoroughfares in the town. These have now been adjusted amicably, on the footing that the Gas Corporation are to pay half of the awards, and the Police Commission are to pay the other half. The payments are made upon the ground of expediency, and without the admission of liability by either body. It seems that there has been an agreement in existence since April, 1890, to the effect that the Police Commission and the Gas Corporation were to jointly undertake liability in such matters. This week the Gas Corporation resolved to give formal notice to the Police Commission that they no longer hold themselves liable for any such claims. The Corporation also resolved that the Engineer and Manager (Mr. R. S. Carlow) should prepare a map of the town, showing the locality and depth of all the gas mains and pipes within the burgh, and that a copy should be transmitted to the Police Commission, with an intimation that it was given on the distinct understanding and condition that its correctness was in no way warranted. When this map is lodged with the Police Commissioners, it will lie with them to frame regulations for the use of road-rollers and for the conducting of traction-engine traffic.

Sheriff Berry, of Lanarkshire, has been holding an inquiry at Hamilton into the question of whether the Secretary for Scotland ought to permit the Corporation to promote a Provisional Order to repeal certain provisions of the Hamilton Burgh Act by which mines and minerals within the burgh are exempted from assessment. The mineral owners, of course, resist the suggestion of the Corporation. The proposal to assess minerals is made chiefly on the ground that it will, to some extent, recoup the Corporation for outlays which are caused by subsidences on account of underground workings. In this connection, it was brought out how serious is the damage inflicted upon the gas undertaking by these workings. Mr. W. Ewing, the Gas Manager, giving evidence, said that when he took charge of the Hamilton Gas-Works he found great damage was being caused by underground workings. The pipes were in an inefficient condition, and he put them in good repair. Notwithstanding this numerous breakages went on, and the pipes in many places had to be repaired almost continuously. A great deal of expense had been incurred in searching for the leaks, and in repairing them. He put in the following statement of the yearly cost of repairs from coal workings: 1892-3, £1266 8s. 3d.; 1893-4, £1106 13s. 11d.; 1894-5, £823 1s. 11½d.; 1895-6, £780 16s. 3d.; 1896-7, £1090 8s. 0½d.; and 1897-8, £401 17s. 9½d. In a town like Hamilton, from 5 to 10 per cent. would be a proper amount of leakage. He described a case where there had been an escape of 9000 cubic feet of gas in twenty-four hours. Mr. T. Wilson, of Coatbridge; Mr. A. Bell, sen., of Dalkeith, and Bailie MacHale, Convener of the Gas Committee, also gave evidence as to the condition of the mains.

The Dunoon Police Commissioners on Wednesday remitted to their Lighting Committee to enter into negotiations with the Dunoon Gas Company, with a view to the Corporation acquiring the undertaking.

Mr. John Montgomerie, a Director of a company who recently started a large corn-mill at Haddington, gives the following account of the result of their employing Mr. Leicester Gataker to search for water for them, by means of the divining-rod: "Owing to the inadequate supply of water in the burgh of Haddington, we were unable to get a supply for our new maltings, and we decided to call in the aid of Mr. Gataker to prospect our ground, and locate a spot suitable for putting down an artesian well. He located two places—one at the end of our new buildings, the other in

a field about 70 yards distant. He guaranteed that we should get a small quantity of water at 60 feet; and that at a depth of from 100 to 150 feet we should get 20,000 gallons per day with a 4-inch bore. We are pleased to say that Mr. Gataker's statement has turned out absolutely correct; the only difference being that we have got about three times the quantity he mentioned, and at a depth of 103 feet—the water rising 13 feet above the surface. We discovered the water last Monday, after piercing through 15 inches of sandstone rock at the above depth."

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Jan.* 14.

Sulphate of Ammonia.—There has been a well-sustained demand at hardening prices; and the closing quotations are £10 7s. 6d. to £10 10s. per ton, delivered f.o.b. at the ports. Makers continue to offer their output as it becomes available; and the larger lots have been mostly sold up to the end of January at about the level of spot prices. Consumers have come more into line with the market, and have bought freely, both for prompt and early delivery; but the largest share of the business done has been for "covering" sales. In the forward position, £10 10s. per ton is now required f.o.b. Leith, ordinary terms, February-June delivery; but so far no business is reported at the price. London (Beckton terms), April-June delivery, is quoted £10 5s. per ton.

Nitrate of Soda remains firm, but quiet, at 7s. 7½d. per cwt. for good, up to 7s. 9d. per cwt. for refined, quality.

LONDON, *Jan.* 14.

Tar Products.—This market has been dull and uninteresting ever since the turn of the year. The hope that was entertained that benzol would improve has so far not yet been realized, although it is rumoured that the German producers are more in accord with each other in respect to production and the disposition of it. If gas manufacturers would only appreciate the value of benzol at its present price for illuminating purposes, the surplus production would at once disappear. At the current figure, it is more than ever the cheapest material for enriching gas. A good deal is undoubtedly being used for this purpose; but much more must be taken up if better prices are to obtain. Buyers offer but a poor price for anthracene; and though production continues daily to decrease, no one seems to have much faith in its early improvement. It may, however, come sooner than expected, as both production and stocks are disappearing. Business has been done in pitch at a somewhat higher price; and it looks as if this article might be better. Stocks of pitch in makers' hands are lower than usual; and the consumption is undoubtedly larger. One or two tar contracts have been let at very low prices; but the tar in both instances is of a very inferior character.

The following are the average prices obtaining: Tar, 14s. to 19s. Pitch, east coast, 24s.; west coast, 21s. 9d. Benzols, 90's and 50's, 8d. Toluol, 1s. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 2d. Crude, 30 per cent., naphtha, 3¾d. Creosote, 3d. Heavy oils, 50s. Carbolic acid, 60's, 2s. Creosote salts, 35s. Anthracene, nominal, "A" quality, 4d.; "B," 2⅝d.

Sulphate of Ammonia.—The strong demand for prompt continues, and materially higher prices are being offered for early delivery; while for spring delivery, the outlook is encouraging, and in one or two ports business is possible at higher prices than now quoted. Great interest attaches to the article in consequence of the action of the Sulphate of Ammonia Committee. The information respecting sulphate they have promulgated, and the large sums they are offering as prizes, has had a very remarkable effect upon the status of sulphate. Much curiosity exists as to who will be the winner of the prize offered by the Committee for the best essay on "The Use of Sulphate." To-day's value at all ports may be taken as £10 7s. 6d., less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The coal trade of this district is moving on very strongly, and Lancashire colliery proprietors have no difficulty in maintaining the advance upon all descriptions of fuel. The irregularity of the upward move in some of the outside districts, especially Derbyshire and Yorkshire, has a somewhat unsettling effect on the market, with the result that merchants and large buyers in many cases are restricting their purchases in the hope possibly of being able to place them more favourably elsewhere, and thus bring some pressure to bear upon the colliery owners in Lancashire. Any limitation of orders, however, is, for the present at least, rather welcomed than otherwise by colliery proprietors in this district, who are pressed for deliveries to meet the requirements of their regular customers. Prices are exceedingly firm at the full quoted rates of 12s. to 12s. 6d. per ton for best Wigan Arley, 10s. 6d. to 11s. for seconds Arley, 10s. to 10s. 6d. for Pemberton four-feet, 9s. to 9s. 6d. for common house coal, 8s. 6d. to 9s. for steam and forge coal, 6s. 3d. to 6s. 9d. for best slack, 5s. to 5s. 6d. for good medium, and 4s. 6d. for common sorts. For shipment, steam coal is quoted at 9s. 6d. to 10s. 6d. per ton, with through-and-through coal fetching about 9s. delivered at the ports on the Mersey. The Miners' Conference at Edinburgh has brought the wages question definitely to the front; but from all that can be gathered among representatives of collieries in this district, there would scarcely seem to be any real opposition to the demand put forward for an advance of 7½ per cent., which will bring wages to the level at which they stood prior to the reduction of 10 per cent. two or three years back. At any rate, the action which the Miners' Federation have intimated they would take with regard to wages, causes no excitement in the market, as it is fully expected that matters will be smoothly arranged, and that there will be no interference whatever with the ordinary work of the collieries.

Northern Coal Trade.—There is increased activity in the Northern coal trade, and prices this week are firmer. Best Northumbrian steam coals are 10s. 6d. per ton f.o.b., and steam smalls are 4s. to 4s. 3d. Some heavy contracts for gas coal for Denmark are in treaty, and are likely to lead to an advance of 1s. per ton on last year's prices being paid. The general quotation for occasional cargoes is 8s. 6d. per ton f.o.b. There is no alteration in manufacturing coals. Gas coke is in rather better demand; but prices are unaltered.

Scotch Coal Trade.—After the lull, trade has started with a more hopeful appearance for sellers. Not only are prices up for the present, but there is a better demand for forward delivery. It is believed that rates have advanced almost as far as they will go, unless outward influences should affect them. Of these, there are already two in evidence. The first is a movement for a combination of coalowners, for resisting purposes, which is said to be more hopeful of becoming an accomplished fact than previous attempts in the same direction have been. It is stated that several firms who have hitherto held aloof are willing to join the combination. A preliminary meeting, which ended satisfactorily, has been held. The other influence is a resolution by the representatives of the Miners' Federation of Great Britain at a conference in Edinburgh last week, which, while not actually suggesting, virtually gives its sanction to, a request for an advance in miners' wages by 7½ per cent. In both of these there are opportunities for interference with the ordinary course of trade. Meantime, splint is being offered for six months' delivery at 7s. 9d. per ton at the pit, and ell at 10s. per ton f.o.b. Grangemouth, and 9s. 6d. f.o.b. Glasgow. The current quotations are: Main, 9s. 3d. per ton f.o.b. Glasgow, ell 9s. 6d. to 10s., and splint 10s. The shipments for the week amounted to 61,368 tons—a decrease of 111,837 tons on the previous week, and of 34,758 tons on the corresponding week of last year.

The Ilford District Council and the Gas-Works.—A controversy which has been raging for the past few weeks at Ilford as to the proposed purchase by the District Council of the undertaking of the Ilford Gas Company, led to a poll of the ratepayers on the question, which has resulted in 2038 votes being recorded for, and 1011 against the scheme, for the carrying out of which the Council are promoting a Bill.

Progress of the Spalding Gas-Works.—Under the able management of Mr. J. G. Hawkins, remarkable progress continues to be made in the development of the Spalding Gas-Works. Last year, 40 million cubic feet of gas were manufactured at the works. This is a great increase on the previous year, and more than double the quantity produced some seven years ago. Then the price was 3s. 9d. per 1000 cubic feet net, but now the charge has been reduced to 2s. 6d. During seven years, the number of public lamps has been more than doubled; while the charge for street lighting is about a quarter of what it then was.

Norwich Water Company.—The half-yearly meeting of this Company was held a few days ago—Mr. W. Cadge in the chair. The Secretary (Mr. R. Cooper) read the accounts of the Company to the 29th of September last, as well as the report of the Directors. In the latter, it was stated that there was a balance sufficient to pay a dividend on the ordinary shares at the rate of 6 per cent. per annum (deducting income-tax); leaving £5351 to be carried forward. A dividend at this rate was therefore declared. The new works at Mousehold and Heigham are progressing favourably, and their completion will place the Company in an extremely strong position, to the great benefit of the inhabitants of the district. The existing works of the Company have been maintained in their usual state of efficiency.

New Joint-Stock Companies.—The Somzée-Greyson Intensified Gas-Light Company (1898), Limited, has lately been registered with a capital of £210,000 in £1 shares, to carry on the business of lamps, gas mantles, &c. The Imperial S.C. Acetylene Gas Company, Limited, with a capital of £40,000, in £1 shares, are to acquire the business of manufacturers of, and dealers in, acetylene gas generators and lamps, as hitherto carried on by the Liver Acetylene Gas Company, Limited, of Liverpool and elsewhere. The Electric Resistance and Heating Company, Limited, has been registered with a capital of £120,000, in £1 shares, to adopt and carry into effect an agreement made with the Construction and Investment Company, Limited, to (*inter alia*) carry on the businesses of electricians, gas, hydraulic, and general engineers, &c. The Old-Age Pension and Life Assurance, Limited, with a capital of £250,000, in £100 shares, will carry on the business of life assurance in all its branches, grant annuities and endowments, &c. The Crown Incandescent Gas-Light Company, Limited, with a capital of £10,000, in £1 shares (of which 200 are founders'), is to acquire, work, and deal with any patents and inventions relating to the manufacture and use of gas mantles and apparatus therefor. The Managing Director is Mr. A. Flürscheim, who is to have 7½ per cent. of the net profits. Under the title of Orme, Evans, and Co., Limited, a company has been registered with a capital of £50,000, in £10 shares, to acquire, as a going concern, the business carried on by the Duplex Gas Generator and Furnace Company at Wolverhampton, Birmingham, and Coventry.

Resumption of the Metropolitan Water Inquiry.—At the Guildhall, Westminster, the Metropolitan Water Commission met yesterday for the 43rd time; this being the first sitting after the adjournment for Christmas. Lord Llandaff presided, and all the Commissioners were present. Mr. Balfour Browne said since the last sitting the London County Council had received a letter from the Secretary to the Commission, announcing that they had appointed Colonel Rathborne an Assistant-Commissioner, for the purpose of aiding them in the portion of the inquiry relating to the estimated cost of the Welsh and Thames schemes. He asked if it was the intention that Colonel Rathborne should hold a separate inquiry, or merely deal with the evidence that had been already given. The Chairman said the Commission had had laid before them a vast number of conflicting estimates of the two schemes. To criticize and compare these estimates would be a task of infinite detail and labour; and they therefore intended to refer the examination of the different estimates to Colonel Rathborne, who, if he required evidence to elucidate a particular point, would call witnesses. Mr. Balfour Browne said the County Council were now promoting a scheme for obtaining water from Wales, and a Committee of Parliament would have to decide whether or not it was a proper one. He should very much deprecate Colonel Rathborne anticipating the action of Parliament by any report on the Welsh scheme. Mr. Pope said, on behalf of the Water Companies, he had not the slightest objection to the appointment. After some further conversation on the point, Mr. Charles Hawksley, who was under examination when the Commission last sat, was recalled and further examined. An extended report of the proceedings will appear next week.

The Water Supply of Ash.—The Frimley and Farnborough Water Company are proposing to extend their distribution system to the district of Ash, at a cost of £3000. They have the support of the Parish Council; but before committing themselves to carrying out the work, they are taking steps to ascertain the amount of custom they are likely to receive.

The Past Year's Gas Consumption at Bradford.—Mr. C. Wood, the Gas Engineer of the Bradford Corporation, has issued his statistics for the past year. The quantity of gas sent out from the works was 1,657,499,000 cubic feet, or 1⅓ per cent less than in 1897. The consumption is stated to have been affected by the use of incandescent gas-burners, by the comparatively clear weather, and by the more general adoption of electricity.

Reduction in Price.—The Langley Mill and Heanor Gas Company have sent to their consumers a New Year's greeting in the shape of an ornamental folding card, intimating that after Lady-day next the price of gas will be reduced as follows: For consumptions up to 100,000 cubic feet, from 3s. 4d. to 3s.; above this quantity and under 200,000 cubic feet, from 3s. to 2s. 9d.; and above 200,000 cubic feet, from 2s. 10d. to 2s. 6d. This represents a reduction of 1s. 6d. per 1000 cubic feet in ten years.

Tipton Gas Undertaking.—A public inquiry was held at Tipton last Friday, by Mr. H. P. Boulnois, of the Local Government Board, respecting an application by the District Council to borrow £4000 for gas-works purposes. The Clerk (Mr. G. M. Waring) laid information before the Inspector, which showed that the loans already raised for the gas undertaking amounted to £82,000, of which £13,033 had been repaid. The present loan was required for the purposes of extending the gas-mains and for providing new meters; the proposed expenditure on the first-named being £3000, and on the latter £1000.

Gas Question at Frodingham and Scunthorpe.—The Scunthorpe District Council last Thursday confirmed the resolution to promote the Gas and Water Bill. In reply to a question, the Clerk said the Council were bound to buy the whole of the mains and meters from the Frodingham Iron and Steel Company, including those in Frodingham; and to get over the difficulty they were advised by their Parliamentary Agents to include the Frodingham and Brumby districts in their area of supply, giving them the option of six months' notice. Every attempt would be made to come to a reasonable settlement. The Council did not want to burn one gas-jet in Frodingham.

Morecambe District Council and the Gas-Works.—At the meeting of the Morecambe District Council on Monday of last week, the Chairman (Mr. T. Baxter, J.P.) announced that the Committee appointed some time ago to consider the advisability of purchasing the undertaking of the Morecambe Gas Company, had obtained professional advice, and the result was that they had a unanimous recommendation to submit to the Council to the effect that they should enter into negotiations for the purchase of the Company's undertaking. This recommendation subsequently came before the Council in Committee and was adopted; and a Sub-Committee were appointed to take the necessary steps for carrying it into effect. The Clerk (Mr. Tilly) read the draft objection and representations to the Board of Trade respecting the Provisional Order for enlarging their capital for which the Company are applying; and it was resolved that the same be approved, and sent to the Board.

The Southampton Corporation and the South Hants Water-Works.—The Southampton Borough County Council, at their meeting last Wednesday, passed a resolution to promote a Bill to authorize them to purchase the portion of the South Hants Water Company's undertaking situate within the borough. It was also resolved to oppose the Bill of which the Company have given notice to sanction the construction of additional works and the extension of the limits of supply.

The Southwold Town Council and the Water-Works.—At a recent special meeting of the Southwold Town Council, the Committee appointed to consider the question of the purchase of the water-works presented the following report: "It was resolved that, as the present income of the Water Company appears not to pay 3 per cent. on the value in 1896, *plus* 10 per cent. compensation required, and as additional expenditure will be shortly required in extension of mains and works, this Committee does not recommend the Corporation to purchase." Mr. Debney moved that the report be referred back to the Committee, owing to the absence of details to guide the Council. If the Company showed anything like 3 per cent. profit, the works might, he said, be worth buying after all. Mr. Moore said the decision of the Committee was come to with great regret; but the facts and figures would not justify the Corporation purchasing the works. He therefore proposed the adoption of the report. This was agreed to by 9 votes to 2. It transpired in the course of the discussion that the value of the works in 1896 was put at £10,870.

Yeadon and Guiseley Gas Company's Bill.—A special meeting of the Yeadon District Council was held yesterday week, for the purpose of considering the Bill which has been deposited by the Gas Company. The Clerk read the principal clauses, which propose to abolish the present maximum price of 5s. per 1000 cubic feet of gas, and to establish a standard price of 3s. 6d., with a sliding-scale of profits. A lengthy discussion took place on this provision. It was stated that while the recognized price of gas was at present 3s. 6½d. per 1000 cubic feet, the actual charge to the consumer was only 2s. 8½d.; the other 10d. being given as discount if the account was paid within a fortnight. Several members expressed the opinion that, as the clauses were worded, the Company could, if they were so disposed, at once pay an extra dividend for every penny below the present charge; and that by abolishing the discount and reducing the price of gas to the figure which had been paid with the discount off, they would become entitled to an extra dividend of ten times 5s., or 2½ per cent., while the consumer would get no benefit whatever. This was considered to be most unfair; and it was suggested that the Company should only begin to pay the extra dividend on the reduction of the price below 2s. 8½d. Mr. Jenkinson (who is a Director of the Company) said the Bill was intended to be of mutual benefit to both shareholders and consumers. The shareholders could not get any extra dividend unless the consumers were supplied with gas at a lower price than was at present charged. Opposition to the Bill was suggested; but it was thought that as the Guiseley, Rawdon, and Menston townships were interested in the matter, it would be as well to have a joint meeting of the authorities of the four places to decide what action should be taken. Meeting on Wednesday, the Guiseley District Council decided to attend the conference to be convened by the Yeadon authority—it being considered that the Company were already paying large enough dividends, and that the consumers ought to obtain some benefit from the surplus profits.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 124.

Issue.	Share	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex-Dividend	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.	£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p.c.	22—23	+1	4 11 4	150,000	5	Nov. 30	8	Oriental, Ltd.	7¼—7⅝	+¼	5 8 3
100,000	10	"	7½	Do. 7 p.c.	16—17	..	4 8 3	135,000	5	"	8	Do. New, £4 10s. pd.	6¼—6⅝	..	5 6 8
300,000	100	Jan. 3	5	Australian 5 p. c. Deb.	103—105	..	4 15 3	15,000	5	"	8	Do. do. 1879, £1 pd.	1¼—1⅝	..	4 11 5
200,000	5	Nov. 11	6	Bombay, Ltd.	6¼—6⅝	..	4 8 11	60,000	5	Sept. 29	7	Ottoman, Ltd.	5—5½	..	6 6 2
40,000	5	"	6	Do. New, £4 paid	4¼—5	+¼	4 16 0	500,000	100	Dec. 1	6	People's Gas | 2nd Mtg. of Chicago | Bonds	102—106	..	5 13 2
380,000	Stk.	Aug. 12	12	Brentford Consolidated	277—282	+2	4 5 1								
240,000	"	"	9	Do. New	210—215	..	4 3 9	848,070	10	Oct. 13	6	River Plate Ord.	9⅞—9⅞	+¼	6 3 1
50,000	"	"	5	Do. 5 p. c. Pref.	140—145	..	3 9 0	250,000	Stk.	Dec. 10	4	Do. 4 p. c. Deb.	98—100	..	4 0 0
159,375	"	Dec. 15	4	Do. 4 p. c. Deb.	128—133	..	3 0 2	250,000	10	Sept. 29	10	San Paulo, Ltd.	15½—16½	..	6 1 3
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig.	263—268	..	4 5 10	185,000	Stk.	Sept. 15	10	Sheffield A.	242—245	..	4 1 8
226,320	"	"	8½	Do. A. Ord. Stk.	192—196	..	4 6 9	209,053	"	"	10	Do. B.	242—245	..	4 1 8
933,500	Stk.	Aug. 31	5	Bristol, 5 p. c. max.	125—130	..	3 16 11	447,427	"	"	10	Do. C.	242—245	..	4 1 8
420,000	20	Sept. 29	10	British	47—48	+1	4 3 4	5,600,000	Stk.	Aug. 12	5⅓	South Metrop., 4 p.c. Ord.	140—143	+3	3 14 7
50,000	10	Aug. 12	11½	Bromley, Ord. 10 p. c.	26—28	..	4 2 2	1,460,000	"	Jan. 13	3	Do. 3 p. c. Deb.	100—102*	−1	2 18 10
75,000	10	"	8½	Do. 7 p. c.	20—22	..	3 17 3	60,000	Stk.	Aug. 31	12	Tottenham and | A.	280—290	..	4 2 9
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd.	9¼—10	..	6 0 0	60,000	"	"	9	Edmonton | B.	200—210	..	4 5 9
220,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb.	98—100	..	4 0 0	182,380	10	Dec. 30	5	Tuscan, Ltd.	9½—10¼	..	4 15 3
150,000	20	July 14	8½	Cagliari, Ltd.	29—30	..	5 10 0	149,900	10	Jan. 3	5	Do. 5 p. c. Deb. Red.	99—101	..	4 19 0
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.	14—15	..	4 13 4								
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	57—59	..	5 1 8								
550,000	Stk.	Oct. 13	13½	Commercial Old Stock	310—315	..	4 5 9								
200,750	"	"	10½	Do. New do.	240—245	..	4 5 9					WATER COMPANIES.			
200,750	"	Dec. 15	4½	Do. 4½ p.c. Deb.	145—150	..	3 0 0	746,184	Stk.	Dec. 30	11	Chelsea, Ord.	310—315	..	3 9 10
800,000	Stk.	Dec. 15	10	Continental Union, Ltd.	200—205	..	4 17 7	150,000	"	"	5	Do. 5 p. c. Pref.	168—173	..	2 17 10
200,000	"	"	7	Do. 7 p. c. Pref.	187—192	..	3 12 11	160,000	"	"	4½	Do. 4½ p. c. Pref. '75	147—150	..	3 0 0
51,600	Stk	Aug. 31	14	Croydon A 10 p. c.	305—310	..	4 10 4	175,785	"	Sept. 29	4½	Do. 4½ p. c. Deb.	157—162	..	2 15 7
168,400	"	"	11	Do. B 7 p. c.	255—265	..	4 3 0	1,720,560	Stk.	Oct. 13	7	East London, Ord.	212—217	..	3 4 6
555,000	Stk.	Aug. 12	5½	Crystal Palace Ord. 5 p c.	125—130	..	4 0 9	654,740	"	Dec. 30	4½	Do. 4½ p. c. Deb.	157—160	..	2 16 3
60,000	"	"	5	Do. 5 p. c. Pref.	140—145	..	3 9 0	890,000	"	"	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
486,090	10	July 28	11	European, Ltd.	22½—23½	−½	4 13 7	700,000	50	Dec. 15	7½	Grand | 10 p. c. max.	108—113	..	3 6 4
354,060	10	"	11	Do. £7 10s. paid	17—18	..	4 11 9	310,000	Stk.	Sept. 29	4	Junction | 4 p. c. Deb.	138—143	..	2 15 11
14,993,075	Stk.	—	—	Gas- | 4 p. c. Ord.	118—120	+2	—	708,000	Stk.	Aug. 12	14	Kent	365—370	..	3 15 8
2,600,000	"	—	—	light | 3½ p. c. max.	98—100	+1	—	160,000	"	"	7	Do. New, 7 p. c. max.	212—217	..	3 4 6
3,799,785	"	—	—	and | 4 p. c. Con. Pref.	124—126	..	—	1,043,800	100	Dec. 30	10½	Lambeth, 10 p. c. max.	295—300	..	3 10 0
3,843,975	"	—	—	Coke | 3 p. c. Con. Deb.	100—102	+1	—	406,200	100	"	8	Do. 7½ p. c. max.	225—230	..	3 9 7
70,000	10	Nov. 11	8	Hongkong & China, Ltd.	13½—14½	..	5 10 4	350,000	Stk.	Sept. 29	4	Do. 4 p. c. Deb.	138—143	..	2 15 11
3,800,000	Stk.	"	10	Imperial Continental	22⅜—23⅜	..	4 5 10	500,000	100	Aug. 12	13½	New River, New Shares	432—437	..	3 0 8
376,400	100	Aug. 2	4	Do. 4 p. c. Deb. Red.	98—101	..	3 19 3	1,000,000	Stk.	July 28	4	Do. 4 p. c. Deb.	138—143	..	2 15 11
478,600	Stk.	Aug. 12	8½	Do. 3½ p. c. Deb. "	102—105	..	3 6 8	902,300	Stk.	June 29	7½	South- | Ord.	187—192	+2	3 18 2
75,000	5	Nov. 30	6	Malta & Medn., Ltd.	5—5½	+¼	5 9 1	126,500	100	"	7½	wark | 7½ p. c. max.	173—178	+3	4 4 3
560,000	100	Oct. 1	5	Met. of | 5 p. c. Deb.	110—112	..	4 9 3	489,200	Stk.	"	5	and | 5 p. c. Pref.	168—171	..	2 18 6
250,000	100	"	4½	Melbourne | 4½ p. c. Deb.	105—107	..	4 4 1	1,019,585	"	Oct. 13	4	Vauxhall | 4 p. c. A Deb.	138—143	..	2 15 11
541,920	20	Nov. 11	5	Monte Video, Ltd.	18½—14½	+½	6 18 0	1,155,066	Stk.	Dec. 15	10	West Middlesex	295—300	+2	3 6 8
617,946	Stk.	Aug. 31	9⅜	Newc'tle & Gatesh'd Con.	282—285	..	4 2 8	200,000	"	"	4½	Do. 4½ p. c. Deb.	160—163	..	2 15 3
252,355	Stk.	Dec. 30	8½	Do. 8½ p. c. Deb.	112—115	..	3 0 10	200,000	"	Sept. 15	3	Do. 3 p. c. Deb.	102—105	..	2 17 2

* Ex div.

The Management of the Walsall Gas-Works.—In view of the increase of work in connection with the Walsall Corporation gas undertaking, the Gas Committee have come to the conclusion, after conferring with Mr. J. Tindall (the Engineer and Manager), that it is desirable to appoint a Sub-Manager of the gas-works, who should also discharge the duties of Outdoor Superintendent. The Council have given the Committee authority to invite applications for the appointment at a salary of £250 a year.

The Littleborough District Council and the Gas-Works.—The Littleborough Gas Company have refused the offer of the District Council for the purchase of the gas-works, on the ground that the price offered is far too low. The offer of the Council was between £70,000 and £80,000, which is equivalent to £25 for each £10 share. The Gas Committee of the Council have considered the reply, and have decided to ask the Company to name the lowest price on which they will be disposed to negotiate with the Council.

The Transfer of the Yeovil Gas-Works to the Corporation.—The Yeovil Town Council received on Monday last week a report from the Parliamentary Committee which stated that the Gas Company had sent in a claim for £2101 12s. 7d., the costs and expenses incurred in promoting their own Bill and opposing that of the Corporation. The Committee recommended the Council to require taxation before payment. They also advised that notice be given to the officers of the gas-works that their services will be required by the Corporation. The recommendations were passed.

Extension of the Oldham Corporation Gas-Works.—At the meeting of the Oldham Town Council on Wednesday, the 4th inst., Alderman Harrop, in moving the adoption of the minutes of the Gas Committee, said that they entailed an expenditure of somewhere near £30,000. It seemed to him very important that the Council should know really to what extent they were going to lay out money. During the fortnight ending the 6th ult., they had an increase of 4 million cubic feet of gas compared with the corresponding fortnight of the previous year; and the next two weeks showed an increase on the same basis of 7½ millions. In the fortnight just passed, there had been an increase on similar lines of 9¼ million cubic feet. This meant that it was getting time they prepared for dealing with the great consumption of gas which was gradually overtaking them. The works to be put in hand were new retort-houses, coal-store, and boiler and engine house at Higginshaw, as recommended by the Manager (Mr. J. Chadwick) some months ago. It would require two years to complete this work; and in that time they would have some difficulty in coping with the demands made on the Committee. In carrying out these works, the old system of hand-firing the retorts would be discarded, and mechanical stoking introduced. This was one reason for the increased expenditure; and he thought the Council would see that this work should be done in a modern fashion. Mr. Johnson asked if the Committee had made every inquiry regarding the utility of water gas. Alderman Harrop replied that, so far as he knew or was concerned, he had decided to oppose the water-gas system. The minutes were passed.

The Protection of Water Supplies.—The Water Committee of the Leeds Corporation last Friday had before them the question of the acquisition of certain properties which might become sources of pollution of the water supply of the borough. A number of such properties, situated between Swinley and Lindley Wood, were secured some time ago by the Land Purchasing Sub-Committee; and it was decided to secure others with the least possible delay.

The Gasholder Accidents in America.—We learn from the "American Gaslight Journal" that up to the 2nd inst., the Coroner's Inquiry into the New York gasholder catastrophe had not been commenced; but it was expected to come on within a few days. According to the same authority, an inquest has been held on the three men who lost their lives at the works of the Poughkeepsie (N.Y.) Gas Company, as reported last week; and the verdict was that the fatality was caused by an explosion of gas, but that the reason for the escape could not be satisfactorily traced.

A Curious Gas-Stove Accident.—A painful accident happened last Friday week to Mr. George Clarke, of Haywards Heath. On going into the scullery of his father's house, where there was a gas-stove in use, he noticed a smell of gas and opened the oven-door. This act released a volume of escaped gas from the burners, which came in contact with the lighted part of the stove and exploded. Mr. Clarke was severely scorched all over the face by the flame, and hurt by the shock of the explosion. Medical assistance was obtained; and it will be some time before the sufferer will recover from the effects of the accident.

Gas v. Electricity for Public Lighting at Cadiz.—The estimate framed for the public lighting of Cadiz was 185,000 pesetas (£7400); but it has been considered necessary to reduce it to 130,000 pesetas (£5200). This has caused some discontent. Referring to the subject recently, the "Revista Minera" remarked that it is absurd to think of substituting electric incandescent lamps for gas in places where the latter illuminant is cheap, as great economy can be effected by replacing electric lamps by incandescent gas-burners. If instead of the incandescent burners now employed at Cadiz, those of Kern were adopted, two-thirds more light could be obtained with the same quantity of gas, and greater economy be effected than that proposed by the Municipal Authorities. A citizen of Cadiz, who has given much attention to the question of lighting the city, has published in a local paper an estimate by which, with the 130,000 pesetas the Municipality propose to spend, he provides sufficient light. It is as follows: 1250 gas-burners, 85,000 pesetas; 20 arc lamps from twilight to 12 p.m., 35,247 pesetas; 12 lamps burning 3½ hours during six months, 4790 pesetas; 25 lamps burning 3 hours during four months, 4275 pesetas; total, 129,312 pesetas. The above-named publication suggests, by way of modification of the estimate, with a view to further economy and possible increase of light, the employment of the Kern burner, which would save two-thirds of the gas consumed by the existing burners. Reckoning the cost of cleaning and renewals, the saving for 1250 lamps might be estimated at 25,500 pesetas, or 30 per cent.; and the cost of the arc lamps reduced to give an economy of 17,748 pesetas—together, 43,248 pesetas. Thus the Cadiz Municipality could carry out their scheme of reduced expenditure without any loss of light.

The "CZARINA."

Season 1898-9.

WRIGHT'S
GAS-FIRES.

Unequalled,
Unapproached, and
Without Imperfection.

JOHN WRIGHT & CO.,
Limited,
Birmingham & London.

Trying to Cheat the Prepayment Meter.—A correspondent forwarded the following to the "American Gaslight Journal," from Ottawa: "An ingenious swindle was recently attempted on the Ottawa Gas Company. The Company have installed in the city about 150 prepayment meters, which on the whole have given good satisfaction. One enterprising citizen, however, thought to have his gas and retain his coin as well, so he procured aluminium discs exactly the size of the silver coins, and by inserting these substitutes secured his gas. When the collector made his rounds, he naturally objected to 'taking any old thing' that had been put in. The short-sighted party who had thus abused the meter very readily substituted good coin of the realm for the aluminium discs when threatened with proceedings. He was also compelled to give a bond as a guarantee of good faith towards the meter in future."

Address by the Bishop of Rochester to South Metropolitan Gas Workers.—Last Saturday afternoon, the Bishop of Rochester visited the works of the South Metropolitan Gas Company, Old Kent Road, and delivered an address to about 300 of the employees. The chair was taken by Mr. George Livesey, who was supported by Directors of the Company. The Bishop, in the course of his address, spoke of the harmony existing between employers and employed, and then went on to draw attention to the evils by which they were encompassed; saying that these existed in the gilded chamber as well as in the squalid and dirty dwellings in the poorer parts of London. These evils were attended with sad results for future generations, and were disadvantageous to the nation. The good which existed at the present time in the hearts of Englishmen was due to the fact that they trusted each other, and acted with one common conscience. With all its faults and all its dulness, the English nation contrasted very favourably with other nations. The Bishop concluded his address by announcing that in several churches an endeavour was to be made to clear away many of the difficulties which now beset the pathway of those who desired to lead Christian lives. A vote of thanks was accorded to the Bishop for his address.

Proposals for Increasing the Consumption of Gas in the Hull Corporation District of Supply.—At a meeting of the Hull Corporation Gas Committee yesterday week, the Engineer (Mr. F. J. Bancroft) laid before the members a scheme for increasing the supply of gas to High Street and neighbourhood at a cost of £20,000; and it was resolved to have the work carried out. The Engineer next asked the Committee to take into consideration the advisability of supplying gas upon the prepayment system, believing that the outlay would prove remunerative. He estimated the cost of fitting up a cottage at £5 18s. 9d., and calculated that the increased consumption per consumer supplied in this manner would be 16,000 cubic feet per annum. At an additional charge of 10d. per 1000 cubic feet, the annual return would be 13s. 4d., equal to 11·2 per cent. on the charges to the prepayment suspense account, and sufficient to liquidate the initial cost in nine years. At 3s. 10d. per 1000 cubic feet, 21 cubic feet would be obtained for a penny. In the case of ordinary consumers, who found their own fittings, and desired to pay for the gas by means of a slot meter, and in cases where the Corporation considered it advisable to fix a prepayment meter without supplying any fittings, he recommended that the gas be charged at the rate of 6d. per 1000 cubic feet in addition to the ordinary price, to cover the extra cost of meter and collection. He likewise advised that gas-cookers be let out at an all-round price of 2s. per quarter for any cooker the list price of which was under £8. The Chairman (Alderman Massey) suggested that, in order to encourage the use of prepayment meters, the charge should be 3s. 6d., inclusive of fittings. The Committee decided to adopt these recommendations, altered as suggested by the Chairman.

It is stated that the Amalgamated Society of Engineers paid off during the past year loans amounting to £50,000 incurred during the last strike; and, according to the Secretary (Mr. Barnes), they have started the present year clear, with £200,000 in hand.

The total fall of rain at Rothamsted during 1898 was 20·50 inches, as compared with an average of 29·57 inches for the twenty years ending in 1897. The amount of rain that fell last month was 3·01 inches, against the twenty years' average of 2·42 inches.

The New Year's number of the "Architect and Contract Reporter," of which we have received a copy, contains much interesting matter, and is accompanied by several plates giving examples of ecclesiastical, business, and domestic architecture. There is also a trade supplement.

The San Paulo Gas Company have decided to erect an electric lighting plant for the supply of current for light and power, and have already entered into an agreement to light the new railway stations in course of erection in Sao Paulo. The Company have decided upon this because of the strong position they occupy in Sao Paulo with their new concession for 30 years.

The National Boiler and General Insurance Company, Limited, are distributing their illustrated pamphlet on the "Working of Steam-Boilers;" being instructions for the use of boiler attendants and those in charge of, and responsible for, steam-boilers. It has been compiled by the Chief Engineer and Manager to the Company (Mr. E. G. Hiller) primarily for the use of those who insure their boilers with the Company, and is intended to give them information in reference to various questions concerning the safe and economical working of boilers; but much of the contents is also useful to steam-users generally.

Sir Benjamin Baker, K.C.M.G., Consulting Engineer to the Egyptian Government, and Mr. John Aird, M.P., the Contractor, left London last Wednesday for Egypt, for the purpose of inspecting the enormous works which are now in course of construction at Assouan and Assiout for the new Nile reservoirs, to which reference has been already made in the "Journal." In an interview, immediately before he started for Egypt, Mr. Aird said that Lord Kitchener of Khartoum and Lord Cromer had recently visited the reservoir works, and had expressed great satisfaction with them. Upwards of 5000 men are at work; 300 of them being Europeans. Accompanying the above-named gentlemen was Mr. Wilfrid Stokes, the Managing-Director of Messrs. Ransomes and Rapier, Limited, who have the sub-contract for the sluices and lock gates. There will be 180 of the former and five of the latter, all of which will have to be delivered and erected during the next five years.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
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J. T. WESTCOTT, M.E., Manager.
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CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.		Cubic Feet Daily.
BLACKBURN	1,250,000	TORONTO (Second Contract; Remodelled)	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000	BELLEVILLE	250,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	OTTAWA (Second Contract)	250,000
COLCHESTER	300,000	BRANTFORD (Remodelled)	200,000
BIRKENHEAD	2,250,000	ST. CATHERINES (Remodelled)	250,000
SWINDON (New Swindon Gas Co.).	120,000	KINGSTON, PA.	125,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000	PETERBOROUGH, ONT.	250,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000	WILKESBARRE, PA.	750,000
HALIFAX	1,000,000	ST. CATHERINES (Second Contract)	250,000
TORONTO	250,000	BUFFALO, N.Y.	2,000,000
OTTAWA	250,000	WINNIPEG, MAN.	500,000
LINDSAY (Remodelled)	125,000	COLCHESTER (Second Contract)	300,000
MONTREAL	500,000	YORK	750,000
		ROCHESTER	500,000
		KINGSTON, ONT.,	300,000

CRYSTAL PALACE DISTRICT . . . . 2,000,000 Cubic Feet.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

ANDREW STEPHENSON,
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Telegrams: "*Volcanism, London.*"

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1769.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
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J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
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SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see Jan. 3, p. 10.]

IMPORTANT.

REPAIR your old Retorts with Patent STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Estimates for all kinds of Retort-Settings.
Write CROWTHER, Retort Setter, and Sole Maker of Stickfast Fire Cement, Manor Street, HUDDERSFIELD.

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JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

WANTED, Carbon in 4 Ton Lots, or more; also OIL CARBON.
State Price, f.o.r. at nearest Station, to No. 3031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

WANTED, by the Son of a Scotch Gas Manager, a SITUATION. Thoroughly understands Gas Manufacture, and willing to make himself generally useful. Age 21; and a total abstainer.
Apply, by letter, to No. 3197, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
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Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

LONGTON CORPORATION GAS DEPARTMENT.

APPLICANTS for the Situation of WORKING FOREMAN are thanked for their trouble, and informed that the position is now FILLED UP.

WANTED, by a young Man (married), a Situation as METER INSPECTOR or REPAIRER of Wet and Dry Meters. Could fill position of Collector. Excellent Testimonials from present and past Employers.
Address No. 3192, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, four first-class SERVICE LAYERS.
Apply to the MANAGER, Gas Company, WOLVERHAMPTON.

WANTED, on an Estate, a Gas Stoker for single-handed Works. Handy Man preferred. Small House at Works. Good References indispensable. Wages 25s. House and Firing.
Apply to HY. CROFT, Goldings, HERTFORD.

WANTED, at once, a Leading Gas STOKER, used to Engine and Exhauster. Permanency to a strictly sober and reliable Man. Wages, 32s. per week, and Bonus. Near London.
Apply, by letter, with Reference, Age, &c., to No. 3198, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gas Company in South Wales, a competent HOUSE GAS-FITTER in Compo. and Iron, and experienced in Main and Service Laying. Age not under 28 years.
Apply, with *copies* of not more than three recent Testimonials, to No. 3196, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a small Gas-Works, a good STOKER, who understands Engine and Exhauster and Shovel Charging. Wages 24s. per week during Summer Months and 26s. during Winter Months. None but steady Men need apply.
Apply to A. HOWARD, Manager, Gas-Works, Fazeley near Tamworth, STAFFS.

COUNTY BOROUGH OF WALSALL.
(GAS DEPARTMENT.)

THE Corporation of Walsall require the services of an ASSISTANT MANAGER for their Gas-Works. He must be capable of designing and superintending the carrying out of Extensions of the Works, and competent to undertake the entire control of the Works and the supervision of the Manufacture of Gas in the absence of the Gas Engineer and Manager. Age from 26 to 40. Salary £250 per annum. The appointment to be subject to Three Months' Notice on either side.
A statement of Duties can be obtained from the undersigned, to whom applications, marked outside "Assistant Gas Manager," accompanied by not more than Three Testimonials, are to be sent on or before Tuesday, the 31st of January inst.
Canvassing either directly or indirectly any Members of the Council will be considered a disqualification.
JOHN R. COOPER,
Town Clerk.
Town Clerk's Office, Walsall,
Jan. 13, 1899.

GWYNNE & BEALE'S
PATENT
GAS-EXHAUSTERS AND STEAM-ENGINES
FOR FULL PARTICULARS, APPLY TO THE MAKERS:
GWYNNE & CO.,
Telegrams: "GWYNNEGRAM, LONDON."
HYDRAULIC AND GAS ENGINEERS
(Late Essex Street Works, Victoria Embankment, London),
Telephone No. 95 Holborn.
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

WANTED, for a small Gas-Works, a steady young Man as STOKER. One used to Engine and Exhauster, and who would make himself generally useful.

Apply to the MANAGER, Gas Company, Knighton, RADNORSHIRE.

MAINLAYER AND FITTER.

WANTED, a Mainlayer, with experience in Erection of general Gas Plant. To a steady and reliable Man, the position will be permanent. Age under 40.

State References and Wages, to No. 3194, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a small Gas-Works (now in course of construction), a GAS MAKER to act as Manager. Must be accustomed to Main and Service Laying, and Meter taking or fixing. Wages 25s. per week, with House, Coal, Gas, and Water free, and Garden in which he can grow his own vegetables.

Applications, with recent Testimonials, to be sent to No. 3195, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS STOKER.

WANTED, a strong, steady, and re- spectable Man as STOKER. Must be a good Shovel Charger, used to Engine and Exhauster, and who will make himself generally useful. Wages 30s. per week. Permanency to a reliable man. None but those who have had a similar experience need apply.

Apply, with References, and stating Age, whether married or single, when duties could be commenced, and previous Experience, to HUBERT RUSSELL, Manager, Gaslight Company, Holmfirth, YORKS.

WANTED, immediately, by the Bath Gaslight and Coke Company a CHEMIST, with a good knowledge of Gas Manufacture, &c.

For Particulars apply to Mr. C. S. Ellery, Engineer.

Applications, stating Age, Experience, Salary required, and when at liberty, to be sent to the undersigned, marked "Chemist," not later than the 24th inst.

GEORGE HELPS,
Secretary.

Gas Offices, Bath,
Jan. 12, 1899.

FOR SALE—A new 4-horse power Gas- ENGINE. Being too large for present requirements, it is about to be replaced by a smaller one.

Apply to the SECRETARY, Gas Company, Wimborne, DORSET.

FOR SALE, Cheap, the under- mentioned—

Four Cast-Iron WATER-TANKS, 16 ft. diameter by 6 ft. 3 in. deep.

One Cast-Iron WATER-TANK, 16 ft. diameter by 13 ft. deep.

With Overflow Pipes and all Connections.

Apply to SAMUEL WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

THE AMALGAMATED WATER GAS COMPANIES, LIMITED, IN LIQUIDATION.

FOR SALE, by Private Treaty—The WATER-GAS PLANT, MATERIAL, &c., belonging to the above Company and lying at the Works of Messrs. John Spencer and Sons, Limited, Newburn, near Newcastle-on-Tyne. The Plant was erected in 1890, and up to about Twelve Months ago, when the Company went into Liquidation, has been used in manufacturing Water Gas.

The Plant, &c., consist of:—

1. Wrought-Iron GASHOLDER (Ashmore, Benson, Pease, and Co.'s Patent). Capacity, 60,000 cubic feet or thereabouts.
2. Three Cylindrical Wrought-Iron PRODUCERS, 7 feet 6 inches in diameter, with Valves and Working Gear.
3. Three Cylindrical Wrought-Iron SCRUBBERS, 6 feet in diameter, with Valves and Working Gear.
4. Two No. 4 ROOT'S BLOWERS, 10-inch Cylinders 12-inch Stroke, by Alldays & Onions, Limited.
5. Three Wrought-Iron WATER-GAS BOXES.
6. A large Quantity of 24-inch MAINS, with necessary Valves, &c., a 30-Horse Power BOILER, and other ACCESSORIES.

Offers will be received up to the 23rd inst.; and further Particulars will be given by

JOHN GORDON,
Liquidator.

1, Bond Street, Leeds,
Jan. 9, 1899.

TODMORDEN CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the purchase of the under-mentioned PLANT, which is now thrown out of use, viz.—

One Cylindrical STATION METER; capacity 10,000 cubic feet per hour. Makers. J. & J. Braddock, Oldham.

One Rectangular STATION METER, capacity 25,000 cubic feet per hour, with Valves and Connections complete.

One 6-inch DISTRICT GOVERNOR, with Valves and Bye-Pass complete.

Several second-hand RACK and PINION VALVES, various sizes, in good condition.

The above can be seen at the Corporation Gas-Works, Millwood, Todmorden, on application to the Gas Engineer, Mr. Henry Hawkins.

Tenders to be sent in to the Town Clerk, Town Hall, Todmorden, addressed to the Chairman of the Gas Committee, endorsed "Second-Hand Plant," on or before the 31st of January, 1899.

By order,
H. HAWKINS,
Engineer.

THE Directors of the Ilford Gaslight and Coke Company, Limited, invite TENDERS for the supply of SULPHURIC ACID (B.O.V.), suitable for the Manufacture of Sulphate of Ammonia, and guaranteed free from Cyanides and Arsenic, and of not less Specific Gravity than 1·700.

Price to include delivery in Carboys at the Gas-Works or in Tanks or Carboys at the Ilford Station, Great Eastern Railway Company.

Sealed Tenders, endorsed "Vitriol," and addressed to the Chairman, to be delivered to the undersigned not later than Monday, the 23rd inst., from whom any further Particulars can be obtained.

JAS. H. BROWN.

Gas-Works, Ilford, E.,
Jan. 14, 1899.

CITY OF LEEDS.
(GAS DEPARTMENT.)

THE Gas Committee of the Leeds City Council are prepared to receive TENDERS for the supply of FIRE-CLAY RETORTS, FIRE-BRICK LUMPS, and FIRE-CLAY.

Particulars as to Quantity, with Form of Tender, may be had on application to the undersigned.

Tenders, addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, will be received not later than Tuesday, the 24th inst., endorsed "Tender for Fire Goods."

The Committee do not bind themselves to accept the lowest or any Tender.

R. H. TOWNSLEY,
General Manager.

Municipal Offices, Leeds,
Jan. 12, 1899.

MARKET HARBOROUGH URBAN DISTRICT COUNCIL.

LOAN OF £45,000.

THE above Council invite Tenders for a Loan of about £45,000 to be repaid by equal Half-Yearly Instalments of principal over a period of 40 years, with Interest on the Balance remaining due from time to time.

The money is required for the purchase and extension of the Local Gas-Works, and consequent expenses, under the Market Harborough Urban District Council Gas Act, 1898. A Mortgage or Charge on the Revenue of the Gas Undertaking and the District Fund and General District Rate of the District will be given, subject to existing Loans.

Full Particulars of the Conditions on which the Loan will be accepted can be obtained of me; and all Tenders, stating Rate of Interest required, and inclusive charges for Legal and other Expenses to be sent to me on or before the 1st of February, 1899. Only Principals or their Solicitors will be dealt with.

GEO. O. NICHOLSON,
Clerk to the Council.

Market Harborough.

THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that a HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office, on Tuesday, the 31st day of January inst., at Two o'clock p.m. precisely, to transact the usual Business, including the declaration of a Dividend for the Half Year ending on the 31st day of December last, and to elect Directors and Auditors in the place of those who will at such Meeting go out of office in compliance with the Company's Acts or Schemes of Amalgamation.

Notice is Hereby also Given, that, pursuant to the Standing Orders of both Houses of Parliament, an EXTRAORDINARY GENERAL MEETING of the said Proprietors will be held at the same Office immediately after the said Half-Yearly Ordinary General Meeting, when a Bill to be introduced into Parliament, intituled "A Bill to enable The Gaslight and Coke Company to raise additional moneys, and to purchase, take, and hold Lands, and for other Purposes," will be submitted to the Proprietors then present, either in person or by proxy, for their approval.

By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., Jan. 13, 1899.

THE FOLKESTONE GAS AND COKE COMPANY.
INCORPORATED BY SPECIAL ACT OF PARLIAMENT.

ISSUE OF 1200 NEW ORDINARY SEVEN PER CENT. £10 SHARES.

THE Directors, pursuant to the Folke- stone Gas Act, 1898, and to the Resolution passed by the Shareholders of the Company at an Extraordinary Meeting held on the 21st day of September, 1898, invite TENDERS for 1200 of the COMPANY'S NEW ORDINARY SHARES of £10 each.

The MINIMUM PRICE of the Shares has been fixed at £15 10s. 0d. per Share; and no Tenders under this Price will be accepted.

The whole Purchase Money for each Share must be paid on or before the 28th day of February, 1899; and the Dividend will commence from the day the Purchase Money is paid to the Bankers of the Company.

Tenders must be filled up and signed by the applicants and delivered in sealed envelopes, marked "Tender for Shares," at the Offices of the Company, Folkestone, on or before Thursday, the 9th day of February, 1899.

Printed Forms of Tender and further Information may be obtained on application to the Secretary.

By order of the Board of Directors,
WILLIAM MEDHURST,
Secretary and Manager.

Offices of the Company:
Foord Road, Folkestone, Jan. 2, 1899.

*** The existing 7 per cent. Ordinary Shares of the Company have recently realized by Public Auction prices ranging from £16 5s. to £17 per Share.

SHEFFIELD UNITED GASLIGHT COMPANY.

NEEPSEND STATION.
TO IRONFOUNDERS.

THE Directors of this Company invite TENDERS for the supply and erection (upon Foundations prepared by the Company) of Two CAST-IRON CONDENSERS, each consisting of 264 Pipes 9 inches diameter, with Arch Pipes, Bottom Boxes, Tar Boshes, &c. The Weight of the Two Sets will be about 160 Tons.

Drawings may be seen, and Specification with Bill of Quantities obtained, on application to the Engineer, Mr. Fletcher W. Stevenson.

Sealed Tenders, endorsed "Tender for Condensers," must be delivered by post not later than the first post on Saturday, the 28th day of January, 1899, to the undersigned at the Company's Offices.

The Directors do not bind themselves to accept the lowest or any Tender.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
Jan. 7, 1899.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company WILL BE CLOSED on Saturday, the 21st day of January inst., for the Consolidation and Conversion of the Company's Capital Stocks, in pursuance of the Company's Act of 1898, and for the payment of Dividends for the Half Year ended the 31st of December, 1898, on the Company's Capital Stocks, and will be RE-OPENED immediately after the Half-Yearly Ordinary General Meeting of the Company to be held on the 25th day of February next.

By order,
JAMES RANDALL,
Secretary.

Gas Offices, Willoughby Lane,
Tottenham, Jan. 13, 1899.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Cannon Street Hotel, in the City of London, on Wednesday, the 8th day of February next, at Two o'clock in the afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half Year ended the 31st of December last, to declare a Dividend for the same period, to elect two Directors in the place of those retiring by rotation, and to elect an Auditor in the place of Mr. William Westcott deceased. Any proprietor intending to become a candidate for the vacant Auditorship must give notice in writing at the Office of the Company, at least fourteen Days previous to the day of election. He must have been a Shareholder for the space of Six Calendar Months, and possess at the time of his election Stock of the nominal value of £1000.

The TRANSFER BOOKS WILL BE CLOSED from the 25th day of January until after the Meeting.

By order,
FRANK BUSH, Secretary.

Offices: 709A, Old Kent Road, S.E.,
Jan. 14, 1899.

SOUTH METROPOLITAN GAS COMPANY.

SALE BY TENDER OF £60,000 THREE PER CENT. PERPETUAL DEBENTURE STOCK.

MINIMUM PRICE, £101 per Cent.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER £60,000 OF THREE PER CENT. PERPETUAL DEBENTURE STOCK in accordance with the Provisions of the South Metropolitan Gas Acts, 1882 and 1896.

Particulars of same, with Form of Tender, can be obtained at this Office on application to the undersigned; and Tenders must be sent in on or before Tuesday, the 24th day of January, 1899.

The Stock will be allotted to the highest bidders; but no Tender will be accepted at a lower Price than at the rate of £101 money for each £100 Debenture Stock.

By order,
FRANK BUSH, Secretary.

Offices: 709A, Old Kent Road, S.E.,
Dec. 31, 1898.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

Estate of the late G. Purdom, Esq.

GAS AND WATER STOCKS AND SHARES.

IN THE

Commercial Gas Company, West Ham Gas Company, Tottenham and Edmonton Gaslight and Coke Company, Alliance and Dublin Consumers' Gas Company, Croydon Commercial Gas and Coke Company, Guildford Gaslight and Coke Company, Lowestoft Water and Gas Company, Upton-on-Severn Gas Company, Grays Gas Company, Limited, Worthing Gas Company, Waltham Abbey and Cheshunt Gas Company, Goring and Streatley District Gas and Water Company, Limited, Crays Gas Company, and the Ilminster Gas Company.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, the 31st of January, 1899, at Two o'clock precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

THE Acetylene Illuminating Company, Limited, 63, Queen Victoria Street, London, E.C., GIVE NOTICE that they hold the BRITISH PATENT RIGHTS for the MANUFACTURE OF CALCIUM CARBIDE by means of the electric furnace, that they are bringing an action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from so manufacturing that product, and that they intend in the future to bring actions against all infringers of these Patents and all purchasers or users of Carbide of Calcium made in infringement of the same.

ENRICH YOUR GAS
WITH
CHEAP BENZOL.
AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.
Apply to SADLER & CO., MIDDLESBROUGH.

JAMES OAKES & CO.
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

THE NEW
"ST. ALBAN'S"
STREET LANTERN.

Specially adapted for Incandescent Street Lighting. Fitted with Steel Enamelled White Reflector.

H. GREENE & SONS, Ld.,
Late of Cannon Street,
19, FARRINGDON RD., E.C.
Telegrams: "LUMINOSITY, LONDON."

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and Yield of Gas. Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
THE GRASSMOOR CO., Ld.
CHESTERFIELD.

THE SILICA FIRE-BRICK
COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS,
BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.
Trade Mark: "SILICA."
These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

WELDON MUD
FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
ALSO
Removal of last Traces of SULPHURETTED HYDROGEN in catch position.
Full Particulars on application to the Patentees:
GAS DESULPHURIZATION CO.,
— LIMITED. —
1, FENCHURCH AVENUE, LONDON, E.C.

TUBES AND FITTINGS
ALL KINDS
WRITE FOR PRICES
STAFFORDSHIRE TUBE Co., BIRMINGHAM.

HEBBURN MAIN GAS COALS.
Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.
For Prices, f.o.b. Ship or Delivered by Rail, apply to
THE WALLSEND & HEBBURN COAL COMPANY, LTD.,
8 Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

INCANDESCENT GAS LIGHTING.

Incandescent Burners from 5/6 per doz.
Specially annealed best Fireproof Glass Chimneys (equal to the Jena.) 1/4 per Doz.
All other Incandescent Fittings at greatly reduced Prices.
Best "Comet" Bulbs, 3s. per Dozen.
Write for Illustrated Price Lists.
WHOLESALE FITTINGS COMPANY,
80, COMMERCIAL ROAD, LONDON, E.

BOLDON GAS COALS.
ANALYSIS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.
Telegraphic Address: "PARKINSON, NEWCASTLE."

THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON & COAL Co., Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.
Analysis made by
Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . .	10,500	Cub. Ft.
Illuminating Power . . .	16·9	Candles.
Coke (of good quality) . .	67·5	per Cent.
Sulphur	0·58	,,
Ash	2·73	,,

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
Shipments Promptly and Carefully Executed.

London Office: R. Cull, 84, Old Broad St., E.C.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

INCANDESCENT GAS LIGHTING
Has now gained a complete and final Victory over its last and greatest Enemy
VIBRATION,
BY MEANS OF
CLAY'S PATENT
SHOCK-PROOF
Incandescent Burner Fittings
Of which full Particulars may be had from
CLAY & WALMSLEY,
BOLTON, ENGLAND.
Telegrams: "CLAYS, BOLTON."
See "Journal of Gas Lighting," July 7, 1896, p. 19, and Dec. 21, 1897, p. 1365.
London Representatives: H. Greene & Sons, Ltd. 19, Farringdon Road.

LONDONDERRY GAS COALS
FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.
For Prices and Particulars, apply to
S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM

HOLMSIDE GAS COALS.
Present Daily Produce over 5000 Tons.
Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.
Present Daily Produce available 3000 Tons.
Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.
Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.
These Coals may be bought through the Principal Merchants in England, or direct from
MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

EVESON FOR CANNEL
Telegrams: "EVESON, BIRMINGHAM."

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
CANNEL & COAL.

TYNE BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles
Coke per ton	1,301·68 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS,
Coal Owners, Newcastle-on-Tyne;
or
E. FOSTER & CO.,
21, John Street, Adelphi, London, W.C.

WORKMANSHIP and MATERIALS OF THE HIGHEST QUALITY.
PECKETT'S LOCOMOTIVES
Built to any Specification or Gauge.
PECKETT & SONS, Atlas Locomotive Works, **BRISTOL.**

JOHN BROWN & CO., LTD., SHEFFIELD.
Proprietors of
ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.
ALDWARKE MAIN GAS COAL
Analysis: 12,600 Feet of 19-Candle Gas per Ton.
Value in Pounds of Sperm, 820·80.
VERY FREE FROM IMPURITIES.
TELEGRAMS: "ATLAS, SHEFFIELD."

G. & J. HAIGH,

Raven's Lodge Fire-Brick Works, DEWSBURY.

Manufacturers of MACHINE-MADE RETORTS and

FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for **GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.**

For Prices and Analysis, apply as above.

CAUTION! CAUTION! CAUTION!

INCANDESCENT GAS LIGHTING.

ALL DEALERS AND THE PUBLIC ARE

CAUTIONED AGAINST BUYING, SELLING, OR USING EITHER OF THE FOLLOWING MANTLES:—

"SUNLIGHT" COMPANY'S WHITE MANTLES.

"DAYLIGHT" COMPANY'S WHITE MANTLES.

ACTIONS FOR INFRINGEMENT OF PATENT HAVE BEEN COMMENCED by the WELSBACH INCANDESCENT GAS-LIGHT COMPANY, Ltd., against both the above Companies for Infringement of Patent by the **MANUFACTURE AND SALE** of the above White Mantles.

USERS ARE EQUALLY LIABLE WITH DEALERS.

THE WELSBACH INCANDESCENT GAS-LIGHT CO., LD., YORK ST., WESTMINSTER.

R. LAIDLAW & SON

ENGINEERS & IRONFOUNDERS.

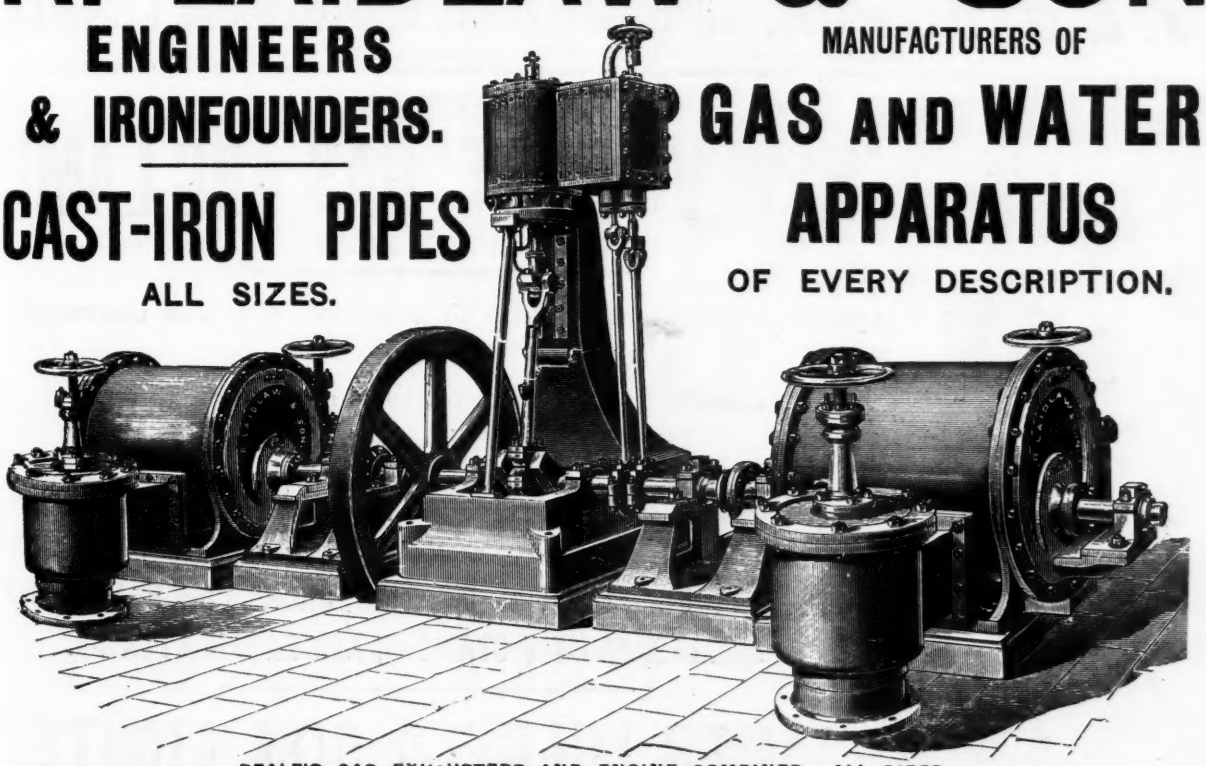
MANUFACTURERS OF

GAS AND WATER APPARATUS

OF EVERY DESCRIPTION.

CAST-IRON PIPES

ALL SIZES.

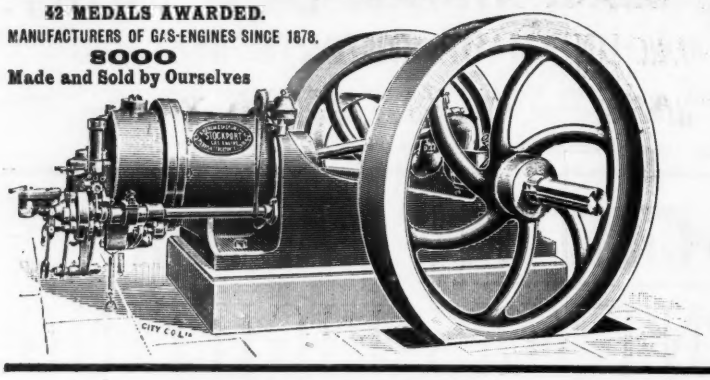


BEALE'S GAS EXHAUSTERS AND ENGINE COMBINED—ALL SIZES.

ALLIANCE FOUNDRY, **GLASGOW.** | SIMON SQUARE WORKS, **EDINBURGH.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

NEW DESIGN "STOCKPORT" GAS-ENGINES

42 MEDALS AWARDED.
MANUFACTURERS OF GAS-ENGINES SINCE 1878.
8000
Made and Sold by Ourselves



With Otto Cycle and our own Patented Improvements.
All Sizes from 1½ H.P. to 250 Brake H.P.

SEND FOR LATEST PRICE LIST.

The Greatest Brake H.P. given for the Smallest Gas Consumption.
SIMPLE IN EVERY DETAIL.

J. E. H. ANDREW & CO., LTD.
REDDISH, near Stockport.
London Address: 80, QUEEN VICTORIA STREET, E.C.
DEPÔTS IN ALL THE PRINCIPAL TOWNS.

Telegrams: "Robustness, London."

RETORT-HOUSE, SETTINGS, & RAILWAY

IN COURSE OF ERECTION BY OUR OWN WORKMEN.

Telephone: No. 756 Bank.

Plans, Estimates, and Specifications prepared and submitted.

Special Facilities for RECONSTRUCTING GAS-WORKS.

CONDENSERS, SCRUBBERS, WASHERS, EXHAUSTERS, TANKS, and every REQUISITE.

A SPECIALITY.
INCLINED and FLOOR-LEVEL SETTINGS with or without REGENERATIVE or GENERATOR FURNACES, with or without IRONWORK.
COMPLETE RE-SETTING.

J. & H. ROBUS, Engineers and Contractors, 20, BUCKLERSBURY, LONDON, E.C.
GASHOLDER TANKS AND MAIN LAYING.

THE 'NEW VIADUCT' GAS ARC LAMP

PATENTED.

Specially constructed for use with the New Welsbach Chimneyless Burner.

Made with lever and chains, or with cock at bottom.

Fitted for One, Two, or Three Burners.

HIGHLY RECOMMENDED FOR STREET LIGHTING.
Wind, Rain, and Draught Proof.
SPECIALLY SUITABLE FOR LIGHTING SHOPS, SHOP WINDOWS, ARCADES, RAILWAY STATIONS, AND EXPOSED PLACES.

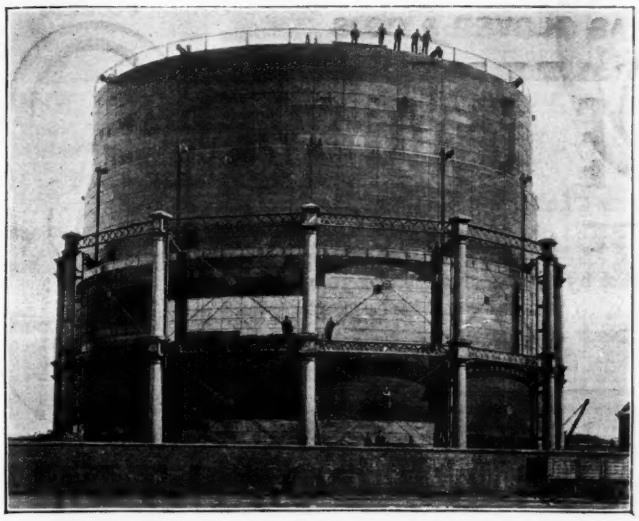
JAMES MILNE & SON, LIMITED

LONDON:	EDINBURGH:	LEEDS:	GLASGOW:
60, Holborn Viaduct.	Milton House Works.	48, Wellington Street.	111, St. Vincent Street.

ASHMORE, BENSON, PEASE, & CO., LIMITED,

Manufacturers of COLUMNLESS GASHOLDERS (Pease's System)

Great Saving in Cost, and Absolutely Reliable in Working.



Four-Lift Gasholder, 120 ft. by 24 ft., three Lifts working on Patent Cables (Pease's System). Wallasey; 1897.

Examples of Patent Cables as applied to Enlargement of Holders to be seen at—

BIRKENHEAD . . .	160 ft. × 30 ft.,	2 lifts added.
WALLASEY	120 ft. × 24 ft.,	2 „
STOCKPORT	150 ft. × 32 ft.,	2 „

One Lift added—

MANCHESTER . .	3 Lifts	130 ft. × 20 ft. (4 Holders).
NOTTINGHAM . .	4 „	100 ft. × 25 ft. (4 Holders).
DARLINGTON . .	3 „	100 ft. × 24 ft.
SELBY	2 „	50 ft. × 23 ft.
DERBY	4 „	125 ft. × 26 ft.
OLDHAM	2 „	120 ft. × 20 ft.
HASLINGDEN . .	2 „	80 ft. × 22 ft.
BARROW-IN-FURNESS	2 „	100 ft. × 21 ft. (2 Holders).
STONE	3 „	42 ft. × 16 ft.

&c., &c.

SPECIALITIES: NEW PATENT WASHER-SCRUBBER, HYDRAULIC AND FOUL MAINS, STEEL TANKS, COLSON'S SULPHATE PLANT, SEMET-SOLVAY COKE-OVENS AND RECOVERY PLANT.

Works: STOCKTON-ON-TEES. Telegrams: "GASHOLDER."

London Office: 181, QUEEN VICTORIA STREET. Telegrams: "APPARATUS."

W. J. JENKINS & CO., LTD.

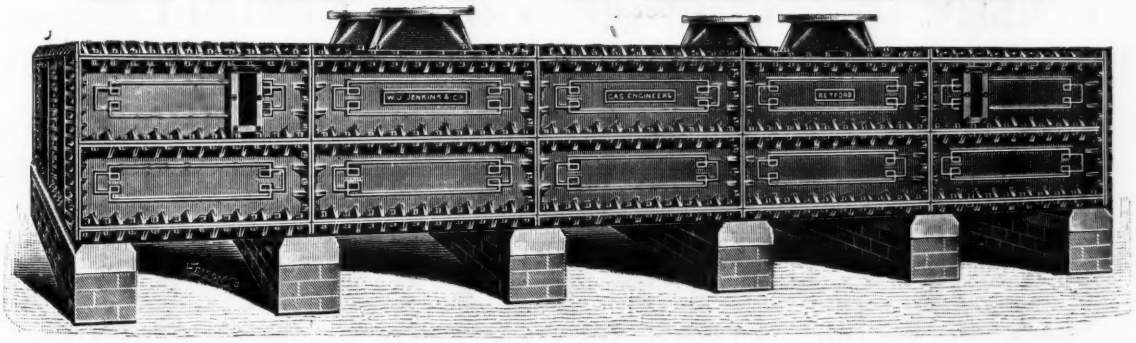
GAS ENGINEERS AND IRONFOUNDERS,

MAKERS OF ALL KINDS OF

PLANT AND MACHINERY FOR GAS-WORKS.

COAL BREAKING, ELEVATING, & CONVEYING MACHINERY.

LIVESEY WASHERS.



5,000,000 Cub. Ft. WASHER AS SUPPLIED TO THE SHEFFIELD UNITED GAS COMPANY.

HIGHLY ECONOMICAL AIR-COMPRESSORS.

GAS COMPRESSORS AND EXHAUSTERS.

TUBULAR CONDENSERS, COOLERS, LIQUOR TANKS, VALVES, &c.

RETFORD.

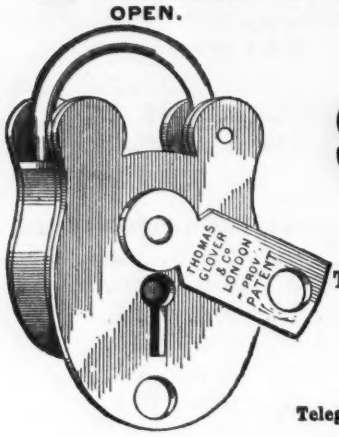
[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS:

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

OPEN.



THOMAS GLOVER & CO.'S

PATENT

SECURE PADLOCK

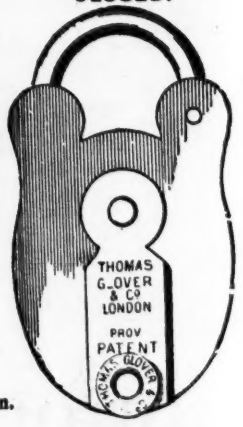
Prevents Tampering with the

CASH-BOXES OF PREPAYMENT METERS.

The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark.

Eyelets easily fixed and removed by Company's Collector.

CLOSED.



Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL:	BIRMINGHAM:	MANCHESTER:	GLASGOW:
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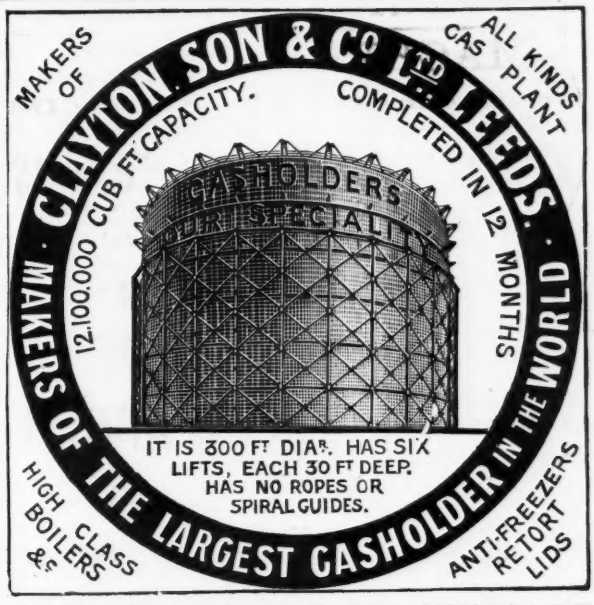
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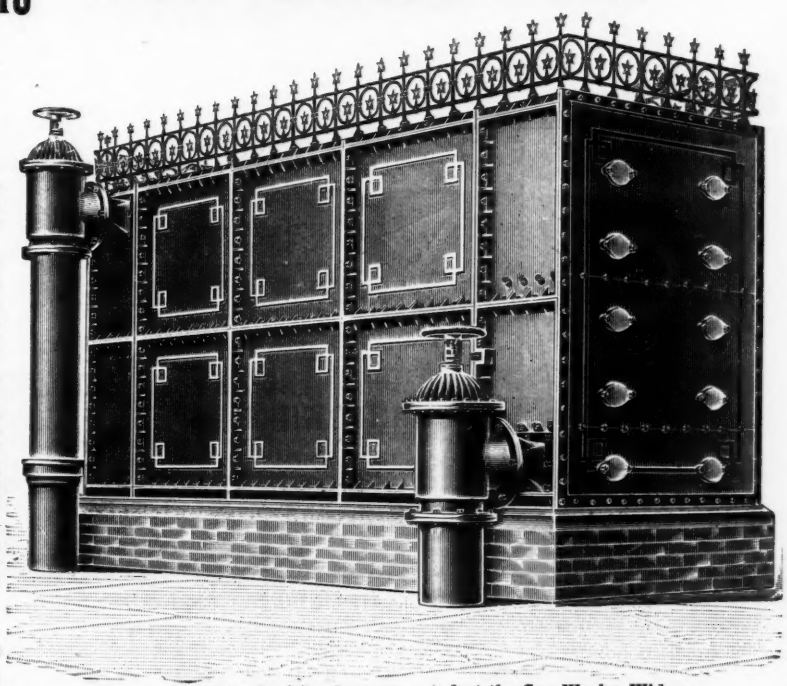

From a Photograph of Condenser erected at the Gas-Works, Widnes. Capacity 1,500,000 cubic feet per 24 hours.

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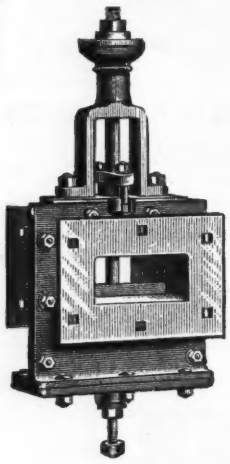

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